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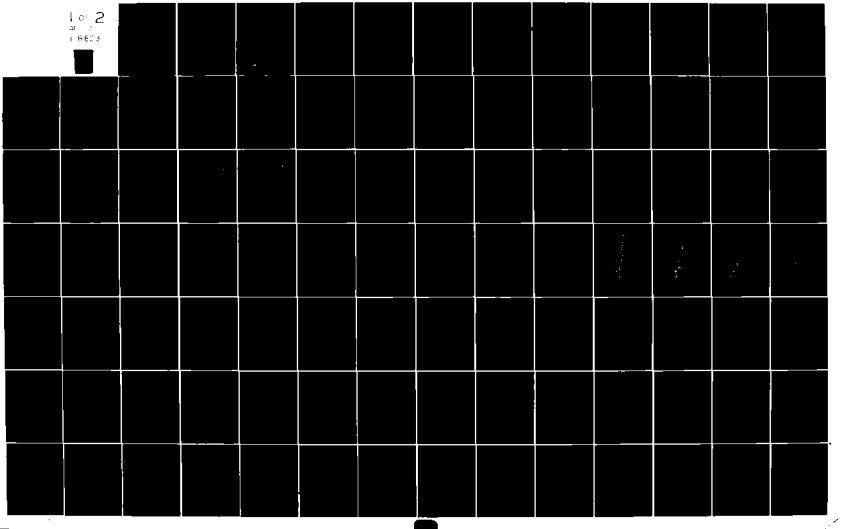

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TEST PLANNING, COLLECTION, AND ANALYSIS OF PRESSURE DATA RESULTING FROM ARMY WEAPON SYSTEMS

Vol. IV Data Analysis of the M198 and M109 May 1979 Firings

Final Report

Steve Slinker
Henry C. Evans

May 1980

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U.S. Army Medical Research and Development Command
Fort Detrick, Fredrick, Maryland 21701

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JAYCOR
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Peak Pressures

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The objective of this research project was the analysis of the overpressure data collected during the M198 and M109 howitzer firings in May 1979. This analysis was required to assess the possibility of non-auditory damage to the crews of these weapons when the howitzers were fired with the M203 charge. The Gunner's position of the M198 towed howitzer was found to be unsafe. The crew compartment of the M109 self-propelled howitzer also had unacceptable overpressures when the compartment hatches were closed.

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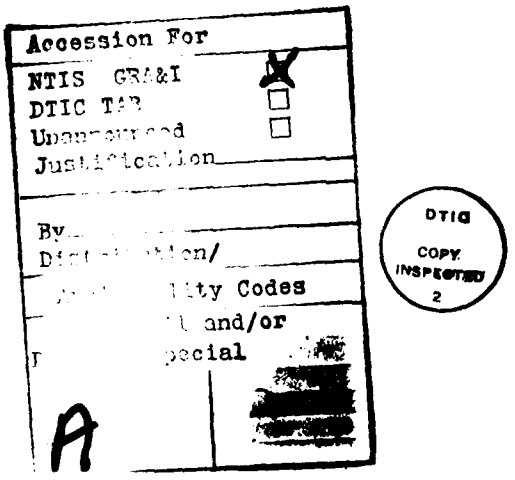
SUMMARY

This report provides the results of the pressure data collected during the firings of the M198 and M109 155mm howitzers using the M203 charge during May 1979 at Aberdeen Proving Ground. The data collection and analysis effort is part of a continuing program undertaken by Walter Reed Army Institute of Research to assess the possibility of lung damage to the crews of these weapons from the acoustical shock waves that are generated during firings. The crew of the M198 howizter will experience shock waves that are above the Z-line as defined in Mil. Standard 1474 when in the C-22 position (Gunners Position). This means that the gunner should move to a less critical location in the interest of personal safety.

The data obtained from the crew compartment of the M109 howitzer shows that with the hatches open the Mil Standard 1474 is exceeded. However, when the hatches were all closed the noise level was acceptable, except there is a ringing much the same as being in a bell. Further analysis should be conducted to clarify the possible dangers of this phenomona.

Overpressures around the outside of the M109 were excessive and ancilliary equipment was damaged. Although not a direct medical safety problem with the crew, it demonstrates the potential of damage to other equipments due to the shock waves emanating from the muzzle brake of this howitzer.



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EXECUTIVE SUMMARY

1-1 INTRODUCTION AND OVERVIEW

From 15 May to 18 May 1979 the M198 towed howitzer and the M109 self-propelled howitzer were fired with the M203 charge at the Aberdeen Proving Grounds. This report gives the results of the overpressure data collected during the firings and an analysis of the data. (See Figure 1-1)

The data collection and analysis effort is part of a continuing program undertaken by Walter Reed Army Institute of Research (WRAIR) to assess the possibility of lung damage to the crews of these weapons from the acoustical shock waves that are generated when the howitzer is fired.

This report is divided into seven sections. Section 2 provides summaries of the peak pressures and B-durations (see Mil-Std. 1474) measured during the test. Section 3 provides a description of the data processing and the calibration of the equipment. Section 4 gives a brief comparison of the M198 data from the May firings with that obtained in November 1978. Section 5 is devoted to a description of the data collected in the interior crew compartment of the M109. Section 6 gives the individual shot data in greater detail than provided in the Summary Section, (Section 2). The last part of this report, Section 7, contains graphs of the different types of pressure-time histories encountered during the test firings. These graphs are further subdivided into the following categories:

- o Sonic Booms
- o Instrument Errors
- o M109 Interior
- o Variation of Waveforms

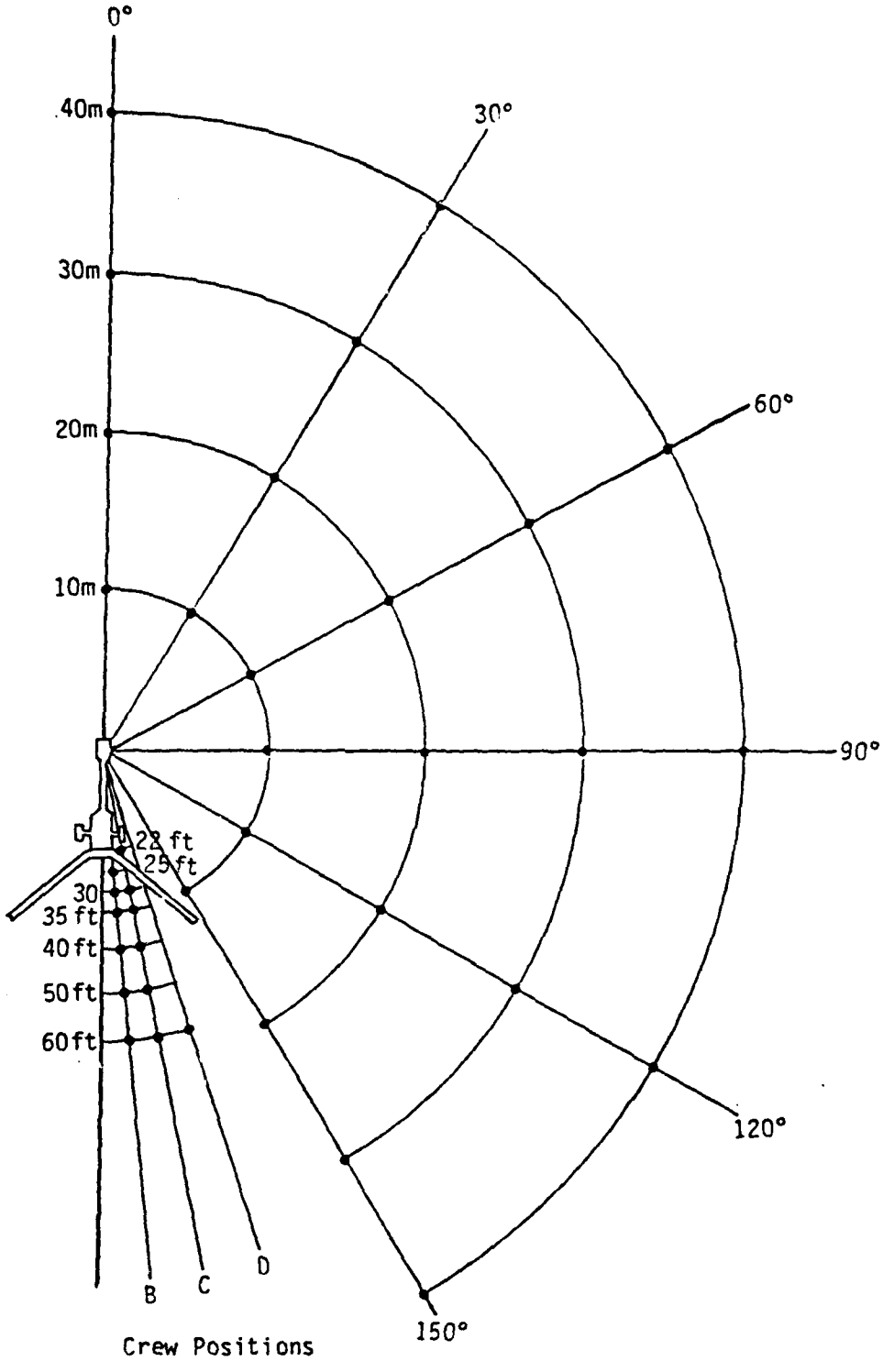


Figure 1-1 Ground map for locations of measurement.

1-2 SIGNIFICANT FINDINGS

As this report contains a multitude of pertinent data and the analysis that has been applied to this data, there are some significant and interesting findings that need highlighting. In an attempt to clarify the potential non-auditory hazards of the M198 and M109 howitzers firing the M203 charge, key points should be examined when an in-depth analysis is made of the data.

The crew of the M198 howitzer will experience shock waves from the M203 charge that are above the Z-line (Mil Std. 1474) while in the C22 position. This means that either the gunner will need to move to a less critical position near the howitzer when firing or some type of protection should be provided for the crew. From all of the gathered data the C22 position was consistently above the accepted military standards of safety.

The data obtained from the crew compartment of the M109 howitzer poses a unique problem. With all the hatches closed, the peak pressures were not a problem for the crew, but the ringing of the shock waves caused by vibrations from the enclosed compartment could be an acoustical problem and a potential non-auditory hazard. The military standards (Mil Std. 1474) uses a classical waveform to judge the acoustical levels, but does not address the type of waveform found within the M109 crew compartment. Therefore, it is suggested that Mil Std. 1474 be examined with emphasis on B-duration criteria, noise levels and times in excess of 200 ms.

The other facet of the crew compartment problem is that when the hatches are opened, overpressures exceeded the Z-line in all hatch configurations tested. Additionally, the pressures that were experienced to the rear and sides of the M109 were great enough to cause damage to the M548 ammunition carrier positioned near the howitzer. Although this is not a medical problem with the crew, it demonstrates that damage can occur to the ancilliary support equipment that is required in a howitzer battery.

It is expected that the data presented and analyzed in this report will be of significance and further use to the medical research and development communities in future investigations with blast overpressure from weapons systems.

SECTION 2
SUMMARY DATA

2-1 INTRODUCTION

From 15 May to 18 May 1979 the M198 towed howitzer and the M109 self-propelled howitzer were fired with the M203 charge at the Aberdeen Proving Grounds. This section of the report gives the summary results of the overpressure data collected during the firing.

2-2 DATA COLLECTION

The data was collected by the US Army Aeromedical Laboratory (U[illegible]) from Ft. Rucker, Alabama. On each shot the overpressure was recorded at ten tions around or near the howitzer. At each of the ten locations (which varied during the testing) an ST-2 transducer was used. On all shots the transducers were placed at a height of 5 ft. above the ground and oriented grazing to the shock wave. The exception were those transducers placed in the crew compartment of the M109 howitzer. These were approximated at 5 ft. above the floor of the compartment. In the case of the driver's hatch, the transducer was at a level with the driver's head.

2-3 M198 TEST-15 MAY

On the first day of the test, 15 May 1979, 48 rounds were fired from the M198. In the morning there were 36 rounds with the howitzer at 0 mils azimuth. The 36 rounds were divided into four groups of nine shots each. The gauges remained fixed during each group of nine rounds and then were moved to other locations. Each group was divided into three subgroups of three shots each. The subgroups are distinguished by different quadrant elevations. For the M198 on this day and on 18 May the quadrant elevations (QE) were 800, 267 and 45 mils.

After the 36 rounds were fired the howitzer was relocated so that it fired at full left traverse. In this configuration, 12 rounds consisting of two groups of six shots were fired. The groups of six shots were divided into two sets of three shots at 800 and 267 mils quadrant elevation. No data was taken for full left traverse at 45 mils QE.

Figures 2-1 through 2-3 summarize the results of this day's testing. These figures show the three shot average peak overpressures and B-durations around the M198 for each gauge location and quadrant elevation. The data from these locations are underlined when at least one of the shots exceeded the Z-line (Mil Std. 1474). A complete explanation of the data is found on the page preceeding the figures. Table 2-1 summarizes the results obtained at location C22. The ST-2 transducers remained in that location for 36 shots.

Table 2-2 gives the peak pressure and B-duration for each individual shot. A more detailed listing of results may be found in Section 6 of the report.

2-4 M109 TEST-16 MAY

On 16 May the M109 was tested. The first round was a practice round to test the equipment and guage placement. Then 45 rounds were fired, consisting of five groups of nine rounds each. These were divided into three subgroups of three rounds differing by quadrant elevation. The quadrant elevations used for the M109 on this day and May 17 were 1225, 510 and 40 mils.

Gauges 5-8 were located inside the crew compartment of the M109 for rounds 1-37 while the remaining gauges were used to map the external field with gauges 9 and 10 around the M548 ammunition carrier which was placed behind the M109. The hatch configuration (open and closed) of the M109 was changed as the test progressed. For rounds 1-10 all the hatches were closed. For rounds 11-19 all hatches were closed except the rear hatch. Only the side and rear hatches were open for rounds 20-28. For rounds 29-37 all the hatches except the driver's hatch (DH) were open.

GAUGE LOCATIONS AND SHOT AVERAGES
M198 TEST
15, 18 MAY 1979

The three sets of numbers given at each location are the three-shot average peak pressures (psi) and B-duration (ms) for QE = 800, 267, 45 mil in that order. For the 400 mil azimuth firing only QE's of 800 and 267 were used.

The data marked with an asterisk was obtained by taking an average of two or fewer shots, i.e., not all three records were available or usable (see data sheets).

The data that is boxed is obtained from Gauge 8. Indication are that readings from this gauge may be in error and it is being investigated by USAARL.

Drawing of howitzer and gauge locations are not to scale.

The data that is underlined contained at least one shot which exceeded the Z-line (Mil-Std. 1474).

GUAGE LOCATIONS
15 MAY 1979

QE :
800, 267, 45

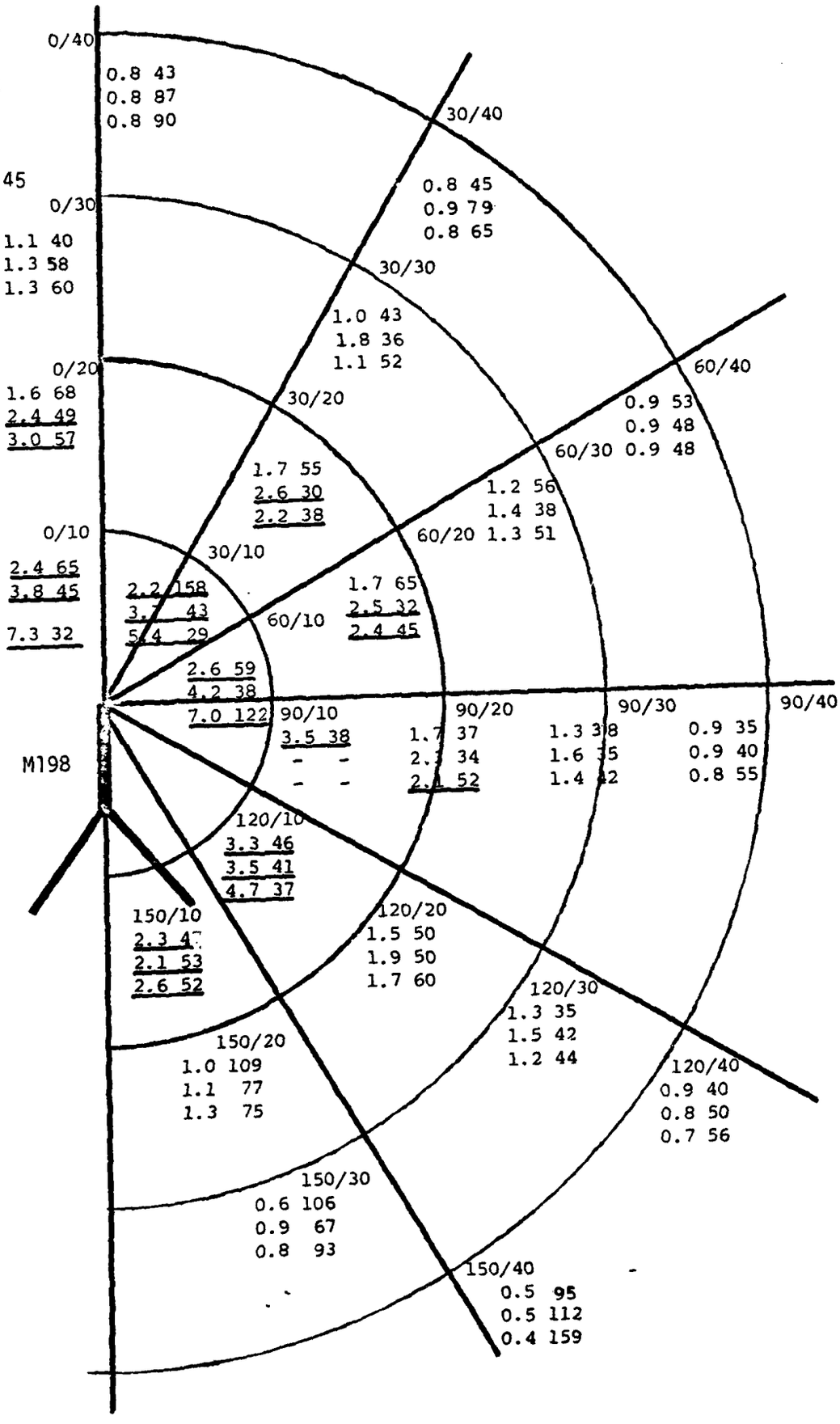


Figure 2-1

GAUGE LOCATIONS
15 MAY 1979

QE/AZ-
800/0 267/0 45/0

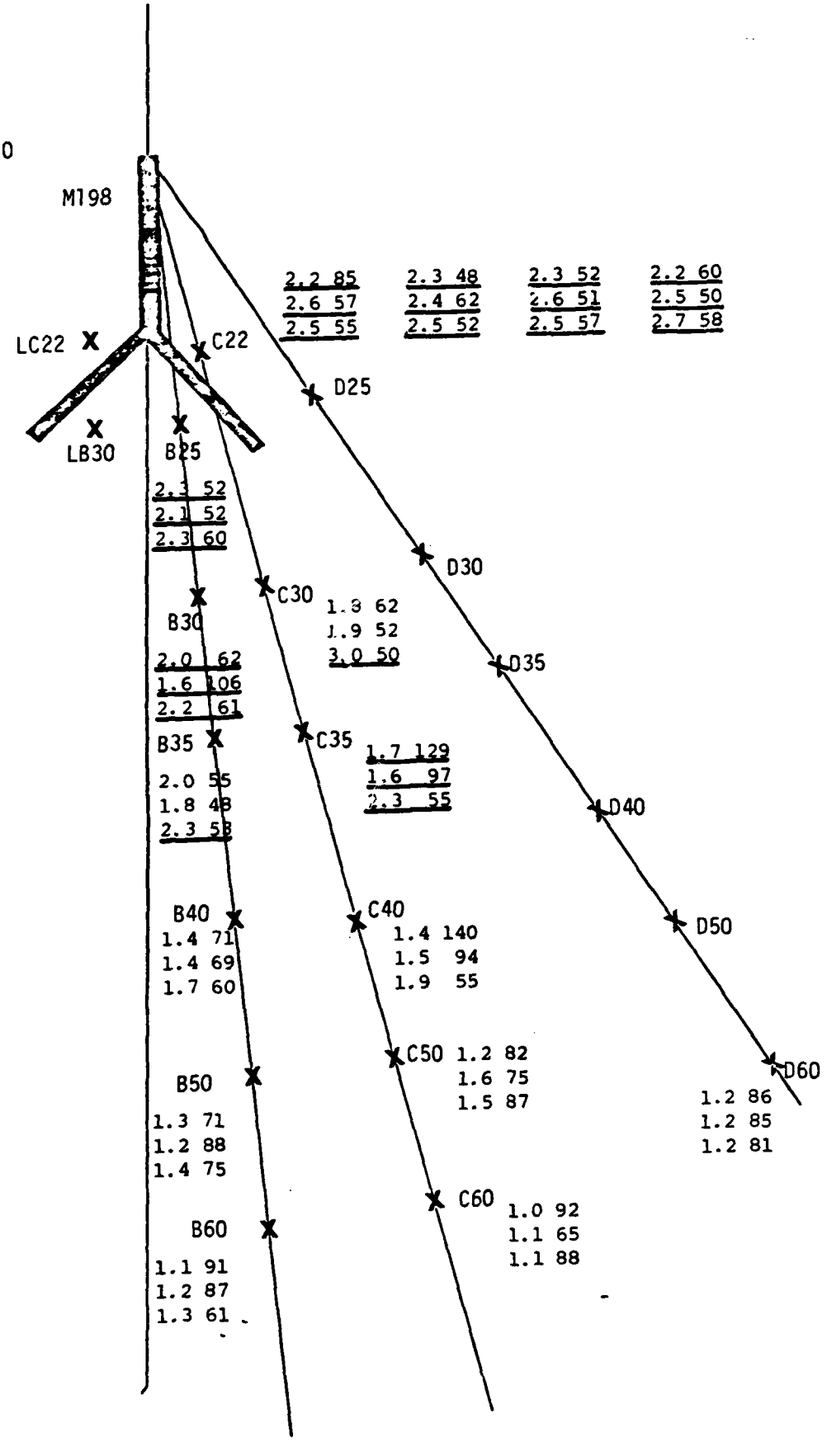


Figure 2-2

GAUGE LOCATIONS
15 MAY 1979

SHOTS 37-48
QE/AZ 800/400, 267/400

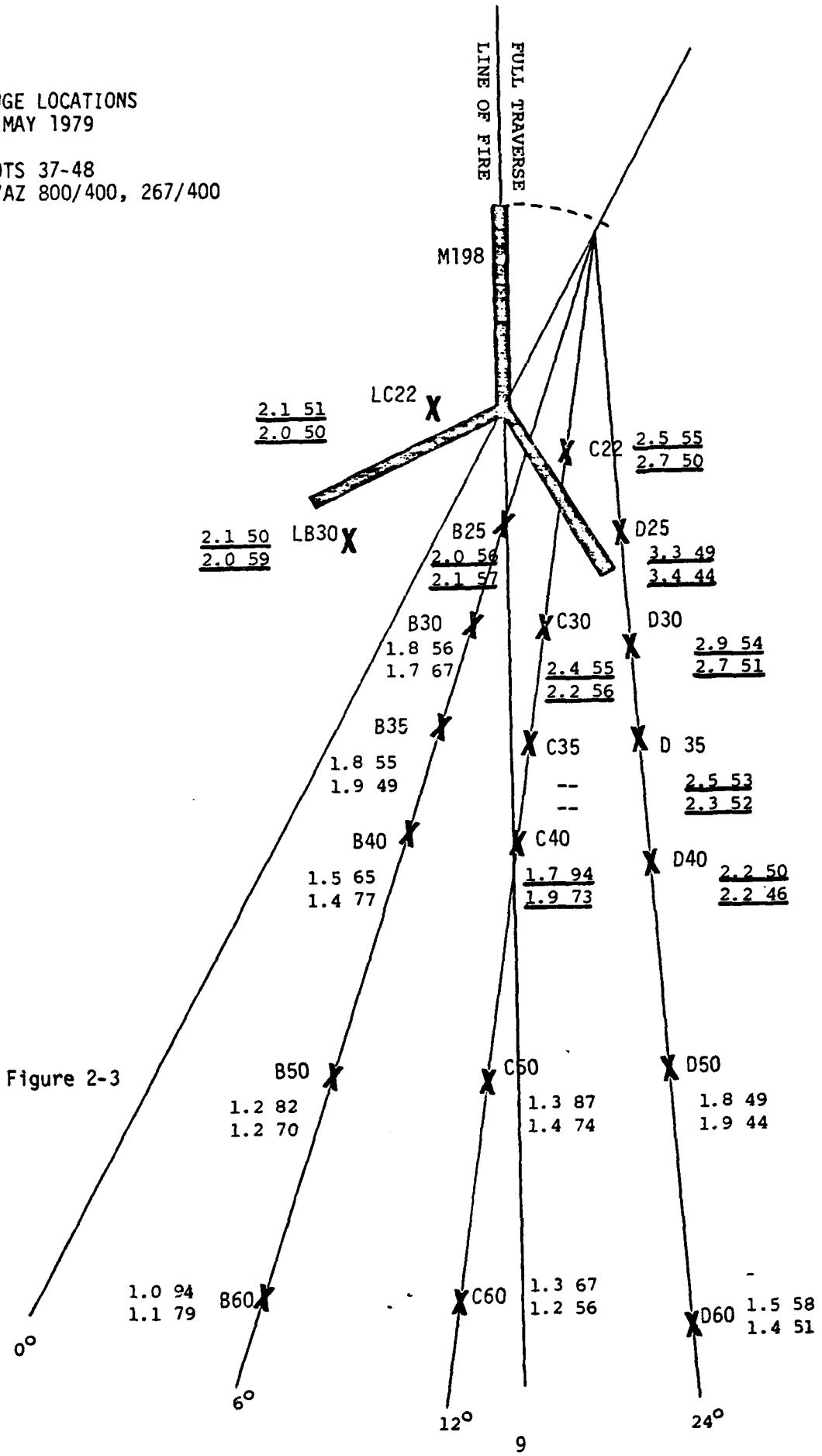


Figure 2-3

On 15 May 1979 one gauge was left at location C22 for Shots 1-36. The results of this gauge are summarized below.

SHOT	QE=800 PEAK	B-DUR	SHOT	QE=267 PEAK	B-DUR	SHOT	QE=45 PEAK	B-DUR
1	2.2	52	4	2.8	61	7	2.4	50
2	2.3	45	5	2.7	66	8	2.6	60
3	2.2	157	6	2.3	44	9	2.5	56
10	2.3	45	13	2.3	58	16	2.8	56
11	2.2	54	14	2.3	53	17	2.3	45
12	2.3	44	15	2.7	74	18	2.5	55
19	2.2	45	22	2.6	55	25	2.5	56
20	2.3	50	23	2.4	50	26	2.5	62
21	2.3	51	24	2.7	49	27	2.5	60
28	2.4	61	31	2.4	45	34	2.6	58
29	2.2	67	32	2.4	55	35	2.7	61
30	2.1	52	33	2.7	49	36	2.7	56
AVERAGE (12 Shots)	2.25	61		2.53	55		2.55	56
STD DEV	.08	31		.19	9		.14	5

Table 2-1

15 MAY 79 M198 TEST ABERDEEN PG

SHOT	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	QE/AZ
	0/40		0/30		0/20		0/10		150/40		150/30		150/20		150/10		B60		C22		
1	0.8	41.	1.1	40.	1.6	60.	2.5	38.	0.5	139.	0.6	109.	0.9	109.	2.2	46.	1.1	90.	2.2	52.	800/0
2	0.8	48.	1.2	40.	1.7	55.	2.4	67.	0.5	84.	0.6	99.	1.0	109.	2.4	49.	1.0	92.	2.3	45.	
3	0.8	41.	1.1	41.	1.6	88.	2.2	91.	0.5	62.	0.6	109.	1.0	108.	2.4	46.	1.1	90.	2.2	157.	
	0.8	43.	1.1	40.	1.6	68.	2.4	65.	0.5	95.	0.6	106.	1.0	109.	2.3	47.	1.1	91.	2.2	85.	
4	0.8	87.	1.3	58.	2.4	49.	3.8	44.	0.5	105.	0.9	70.	1.2	46.	2.2	58.	1.2	81.	2.8	61.	267/0
5	0.8	102.	1.3	70.	2.4	55.	3.6	49.	0.5	87.	0.9	70.	1.1	76.	2.1	57.	1.1	90.	2.7	66.	
6	0.8	73.	1.3	54.	2.3	44.	4.0	43.	0.5	143.	0.9	62.	1.1	108.	2.0	45.	1.2	90.	2.3	44.	
	0.8	87.	1.3	58.	2.4	49.	3.8	44.	0.5	112.	0.9	67	1.1	77.	2.1	53.	1.2	87.	2.6	57.	
7	0.8	112.	1.2	66.	2.8	60.	6.7	40.	0.4	133.	0.8	92.	1.3	43.	2.5	44.	1.4	50.	2.4	50.	45/0
8	0.8	85.	1.2	56.	3.1	65.	7.6	27.	0.5	122.	0.8	93.	1.2	99.	2.6	57.	1.3	76.	2.6	60.	
9	0.7	73.	1.5	58.	3.2	45.	7.7	29.	0.4	223.	0.8	94.	1.3	84.	2.6	56.	1.3	57.	2.5	56.	
	0.8	90.	1.3	60.	3.0	57.	7.3	32.	0.4	159.	0.8	93.	1.3	75.	2.6	52.	1.3	61.	2.5	55.	
	30/40		30/30		30/20		30/10		120/40		120/30		120/20		120/10		C80		C22		
10	0.8	43.	1.0	42.	1.7	68.	2.1	205.	0.9	34.	1.4	32.	1.6	41.	3.4	42.	1.0	105.	2.3	45.	800/0
11	0.8	45.	1.0	48.	1.6	67.	2.2	130.	0.8	45.	1.2	39.	1.5	62.	3.6	53.	1.1	66.	2.2	54.	
12	0.8	48.	1.0	40.	1.9	30.	2.3	140.	0.9	41.	1.2	34.	1.5	48.	3.0	42.	1.0	106.	2.3	44.	
	0.8	45	1.0	43.	1.7	55.	2.2	158.	0.9	40.	1.3	35	1.5	50	3.3	46.	1.0	92.	2.3	48.	
13	0.8	88.	---	---	2.5	31.	3.5	56.	0.8	52.	1.5	39.	1.9	63.	3.6	42.	1.1	65.	2.3	58.	267/0
14	0.9	61.	1.7	30.	2.6	29.	3.6	33.	0.9	50.	1.4	43.	1.9	41.	3.3	34.	1.1	65.	2.3	53.	
15	0.9	89.	1.8	42.	2.7	30.	4.1	41.	0.8	48.	1.5	43.	1.8	46.	3.5	46.	1.1	65.	2.7	74.	
	0.9	79.	1.8	36.	2.6	30.	3.7	43.	0.8	50.	1.5	42.	1.9	50.	3.5	41.	1.1	65.	2.4	62.	
16	0.8	66.	1.2	61.	2.2	52.	5.8	31.	0.7	75.	1.2	41.	1.7	51.	4.8	38.	1.1	87.	2.8	56.	45/0
17	0.8	47.	1.0	38.	2.3	31.	5.4	27.	0.8	46.	1.2	45.	1.7	65.	4.6	30.	1.1	88.	2.3	45.	
18	0.8	81.	1.1	58.	2.2	31.	5.1	28.	0.7	48.	1.2	47.	1.7	65.	4.7	44.	1.1	88.	2.5	55.	
	0.8	65.	1.1	52.	2.2	38.	5.4	29.	0.7	56.	1.2	44.	1.7	60.	4.7	37.	1.1	88.	2.5	52.	
	60/40		60/30		60/20		60/10		90/40		90/30		90/20		90/10		D60		C22		
19	0.8	79.	1.1	79.	1.7	38.	2.7	44.	0.8	34.	1.3	35.	1.7	36.	3.4	34.	1.1	79.	2.2	45.	800/0
20	0.9	42.	1.2	34.	1.7	92.	2.7	72.	0.9	34.	1.3	41.	1.7	33.	3.5	33.	1.2	78.	2.3	50.	
21	0.9	38.	1.2	55.	1.8	66.	2.5	60.	1.0	38.	1.4	38.	1.8	42.	3.5	46.	1.2	100.	2.3	61.	
	0.9	53.	1.2	56.	1.7	65.	2.6	59.	0.9	35.	1.3	38.	1.7	37.	3.5	38.	1.2	86.	2.3	52.	
22	0.9	59.	1.5	41.	2.6	33.	4.1	42.	0.9	37.	1.5	36.	2.3	35.	---	---	1.2	88.	2.6	55.	267/0
23	0.9	45.	1.4	32.	2.3	31.	4.2	31.	0.9	35.	1.7	34.	2.3	34.	---	---	1.3	90.	2.4	50.	
24	0.9	41.	1.4	42.	2.6	32.	4.2	40.	0.9	47.	1.5	35.	2.4	34.	---	---	1.2	69.	2.2	49.	
	0.9	48.	1.4	38	2.5	32.	4.2	38.	0.9	40.	1.6	35.	2.3	34.	---	---	1.2	85	2.6	51	

Table 2-2. M198 - 15 May

25	0.9	57.	1.3	57.	2.4	38.	6.8	68.	0.7	75.	1.4	45.	2.1	45.	---	---	1.2	89.	2.5	56.	45/0
26	0.8	44.	1.3	43.	2.3	60.	7.0	146.	0.8	45.	1.4	42.	2.1	69.	---	---	1.2	97.	2.5	62.	
27	0.9	44.	1.3	53.	2.5	36.	7.2	151.	0.8	45.	1.4	40.	2.2	43.	---	---	1.2	87.	2.5	60.	
	0.9	48.	1.3	51.	2.4	45.	7.0	122.	0.8	55.	1.4	42.	2.1	52.	---	---	1.2	81.	2.5	57.	
	C50		C40		C35		C30		B40		B35		B30		B25		B50		C22		
28	1.1	96.	1.3	111.	1.6	121.	1.8	62.	1.4	82.	2.0	60.	2.0	66.	2.3	59.	1.3	71.	2.4	61.	800/0
29	1.2	75.	1.4	162.	1.8	104.	1.6	72.	1.4	82.	2.0	58.	2.0	70.	2.2	58.	1.3	70.	2.2	67.	
30	1.3	75.	1.4	148.	1.6	161.	1.9	51.	1.4	50.	2.0	48.	1.9	50.	2.3	40.	1.2	71.	2.1	52.	
	1.2	82.	1.4	140.	1.7	129.	1.8	62.	1.4	71.	2.0	55.	2.0	62.	2.3	52.	1.3	71.	2.2	60.	
31	1.5	75.	1.5	132.	1.6	61.	1.8	42.	1.4	42.	1.8	34.	1.6	157.	1.9	49.	1.2	97.	2.4	45.	267/0
32	1.6	75.	1.4	103.	1.6	83.	2.1	56.	1.4	82.	1.8	57.	1.6	72.	2.2	59.	1.3	97.	2.4	55.	
33	1.6	75.	1.5	48.	1.5	147.	1.8	57.	1.5	83.	1.8	53.	1.5	88.	2.3	49.	1.2	70.	2.7	49.	
	1.6	75.	1.5	94.	1.6	97.	1.9	52.	1.4	69.	1.8	48.	1.6	106.	2.1	52.	1.2	88.	2.5	50.	
34	1.5	75.	1.8	60.	2.2	57.	2.8	55.	1.6	60.	2.3	50.	2.1	59.	2.3	58.	1.4	69.	2.6	58.	45/0
35	1.6	90.	2.0	46.	2.5	53.	3.2	42.	1.8	60.	2.3	54.	2.2	66.	2.4	60.	1.5	85.	2.7	61.	
36	1.5	96.	1.8	60.	2.3	56.	2.9	53.	1.7	61.	2.2	55.	2.2	57.	2.1	61.	1.4	70.	2.7	56.	
	1.5	87.	1.9	55.	2.3	55.	3.0	50.	1.7	60.	2.3	53.	2.2	61.	2.3	60.	1.4	75.	2.7	58.	
	C50		C40		C35		C30		B40		B35		B30		B25		B50		C22		
37	1.3	87.	1.7	94.	---	---	2.4	62.	1.5	72.	1.7	66.	1.8	65.	2.1	60.	1.2	82.	2.4	65.	800/400
38	1.3	87.	1.7	94.	---	---	2.3	43.	1.5	42.	1.8	40.	1.7	40.	1.9	44.	1.2	82.	2.5	47.	
39	1.4	87.	1.8	94.	---	---	2.6	61.	1.5	82.	1.8	59.	1.8	62.	2.0	63.	1.1	82.	2.6	52.	
	1.3	87.	1.7	94.	---	---	2.4	55.	1.5	65.	1.8	55.	1.8	56.	2.0	56.	1.2	82.	2.5	58.	
40	1.4	87.	1.9	53.	---	---	2.2	60.	1.4	67.	2.2	38.	1.6	73.	1.9	60.	1.2	82.	2.5	52.	267/400
41	1.3	87.	1.8	70.	---	---	2.2	54.	1.4	113.	1.8	58.	1.6	75.	2.1	62.	1.2	82.	2.6	56.	
42	1.5	47.	1.9	95.	---	---	2.1	53.	1.4	51.	1.8	52.	1.8	52.	2.3	49.	1.2	45.	3.0	43.	
	1.4	74.	1.9	73.	---	---	2.2	56.	1.4	77.	1.9	49.	1.7	67.	2.1	57.	1.2	70.	2.7	50.	
	D40		D35		D30		D25		D60		D50		LB30		LC22		B60		C60		
43	2.1	58.	2.3	59.	3.0	55.	3.3	54.	1.7	59.	1.8	54.	2.1	65.	2.2	70.	1.0	99.	1.3	92.	800/400
44	2.1	45.	2.6	42.	3.0	48.	3.2	45.	1.3	57.	1.8	45.	2.1	41.	2.1	43.	1.0	74.	1.3	57.	
45	2.4	46.	2.5	57.	2.8	60.	3.5	49.	1.5	57.	1.8	47.	2.0	45.	2.1	41.	1.0	99.	1.3	53.	
	2.2	50.	2.5	53.	2.9	51.	3.3	49.	1.5	58.	1.8	49.	2.1	50.	2.1	51.	1.0	94.	1.3	67.	
46	2.3	53.	2.4	50.	2.8	57.	3.9	40.	1.4	57.	1.9	42.	2.2	65.	2.1	59.	1.1	90.	1.3	59.	267/400
47	2.1	46.	2.1	44.	2.7	50.	3.4	43.	1.3	45.	1.8	42.	1.9	64.	2.0	47.	1.0	74.	1.2	39.	
48	2.7	50.	2.4	53.	2.7	46.	2.9	49.	1.4	51.	1.9	49.	2.0	49.	2.0	44.	1.2	74.	1.2	70.	
	2.2	46.	2.3	52.	2.7	51.	3.4	44.	1.4	51.	1.9	44.	2.0	59.	2.0	50.	1.1	79.	1.2	56.	

Table 2-2 (Continued)

The interior gauges were located in the front left (FL), front right (FR), rear left (RL) and rear right (RR) of the crew compartment enclosure. For shots 1-10 they were mounted on vertical rods secured to the frame of the crew compartment. For round 11-37 they were mounted directly to the turret. A more detailed discussion of the results from the interior gauges is given in Section 5.

Summaries of the results of May 16 firings are given in Figures 2-5 and 2-6 and Tables 2-3 and 2-4.

2-5 M109 TEST-17 MAY

On 17 May, the third day of testing, the M109 was fired again for 61 rounds. Part of the test was devoted to determining the shock fields around the M548 ammunition carrier. On round 17 of this day the center window of the M548 was blown out. For rounds 19-36 the M548 was removed from the test.

The howitzer was then shifted to full left traverse and the M548 was again placed in position behind the howitzer. On round 40 the driver's window was broken and it was noticed that 5 cargo compartment metal ribs were cracked. On round 43 the passenger's window was broken, the right side bowed and there was increased cracking in the ribs. The curent shot sequence was abandoned and the M548 removed to prevent further damage. Nine more rounds were fired without the M548 in position.

Summaries of this day's results are found in Figure 2-7 through 2-11 and Table 2-5.

2-6 M198 TEST 18 MAY

The last day of testing was devoted to the M198 fitted with a chrome gun tube (chrome is added to the lands and groves within the barrel to prolong the life of the gun tube). Nineteen rounds were fired following the format of the other day's tests. Round six was a misfire. The results of 18 May are summarized in Figure 2-4 and Table 2-6.

GAUGE LOCATIONS AND SHOT AVERAGES
M109 TEST
16 - 17 MAY 1979

The three sets of numbers given at each location are the three-shot average peak pressures (Psi) and B-Durations (ms) for QE = 1225,510,40 mil in that order.

The data marked with an asterisk was obtained by taking an average of two or fewer shots, i.e., not all three records were available or usable (see data sheets).

The data that is boxed is obtained for Gauge 8. Indications are that readings from this gauge may be in error and are being investigated by USAARL.

Drawings of howitzer and gauge locations are not to scale.

The data that is underlined contained at least one shot which exceeded the Z-line (Mil Std. - 1474).

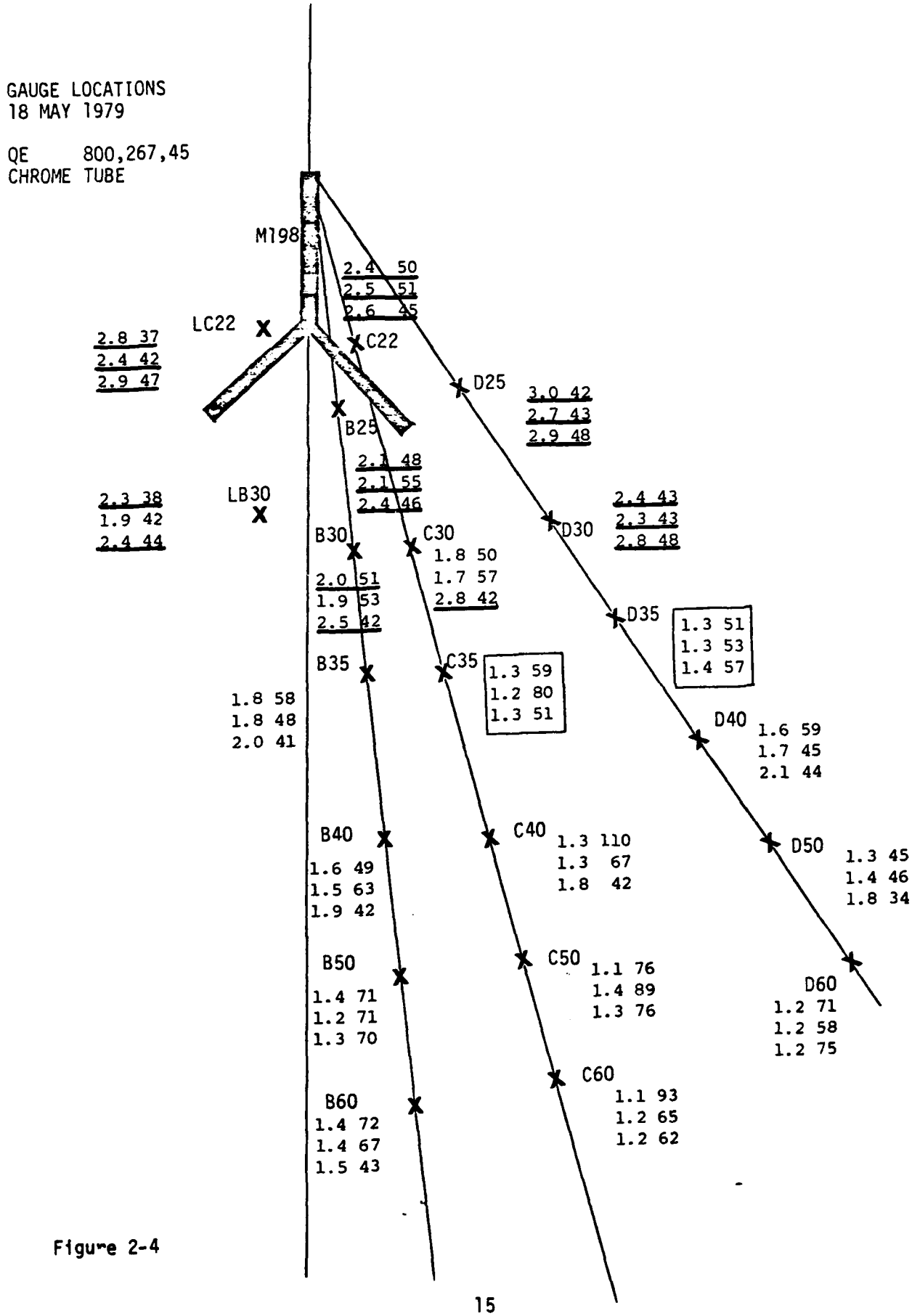

GAUGE LOCATIONS
18 MAY 1979
QE 800,267,45
CHROME TUBE
M198
LC22
C22
B25
D25
LB30
B30
C30
D30
B35
C35
D35
B40
C40
D40
B50
C50
D50
B60
C60
D60
2.4 50
2.5 51
2.6 45
2.8 37
2.4 42
2.9 47
3.0 42
2.7 43
2.9 48
2.3 38
1.9 42
2.4 44
2.4 43
2.3 43
2.8 48
1.8 50
1.7 57
2.8 42
2.0 51
1.9 53
2.5 42
1.3 51
1.3 53
1.4 57
1.8 58
1.8 48
2.0 41
1.3 59
1.2 80
1.3 51
1.6 59
1.7 45
2.1 44
1.3 110
1.3 67
1.8 42
1.6 49
1.5 63
1.9 42
1.3 45
1.4 46
1.8 34
1.1 76
1.4 89
1.3 76
1.4 71
1.2 71
1.3 70
1.2 71
1.2 58
1.2 75
1.1 93
1.2 65
1.2 62
1.4 72
1.4 67
1.5 43

Figure 2-4

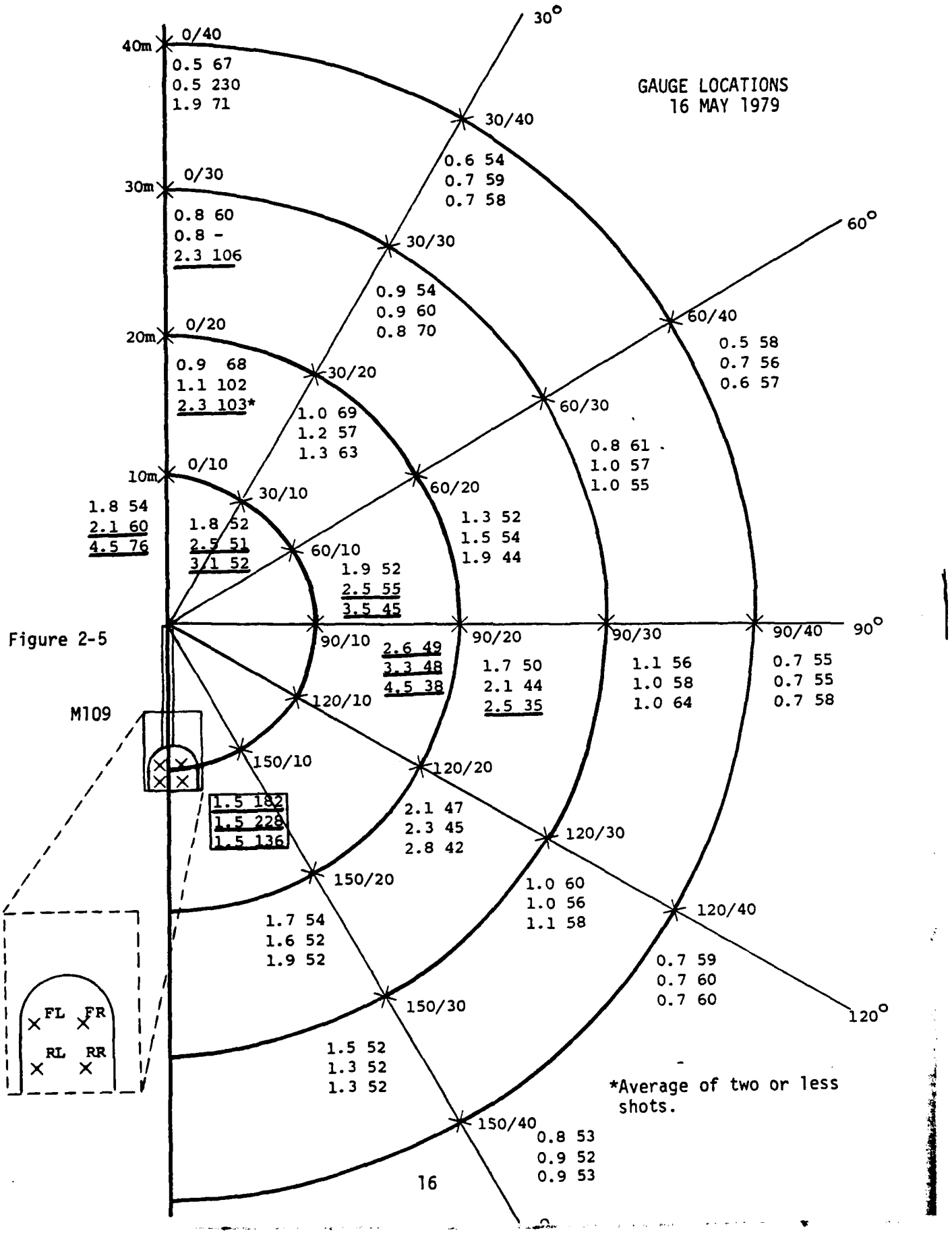


Figure 2-5

*Average of two or less shots.

GAUGE LOCATIONS 16 MAY 1979

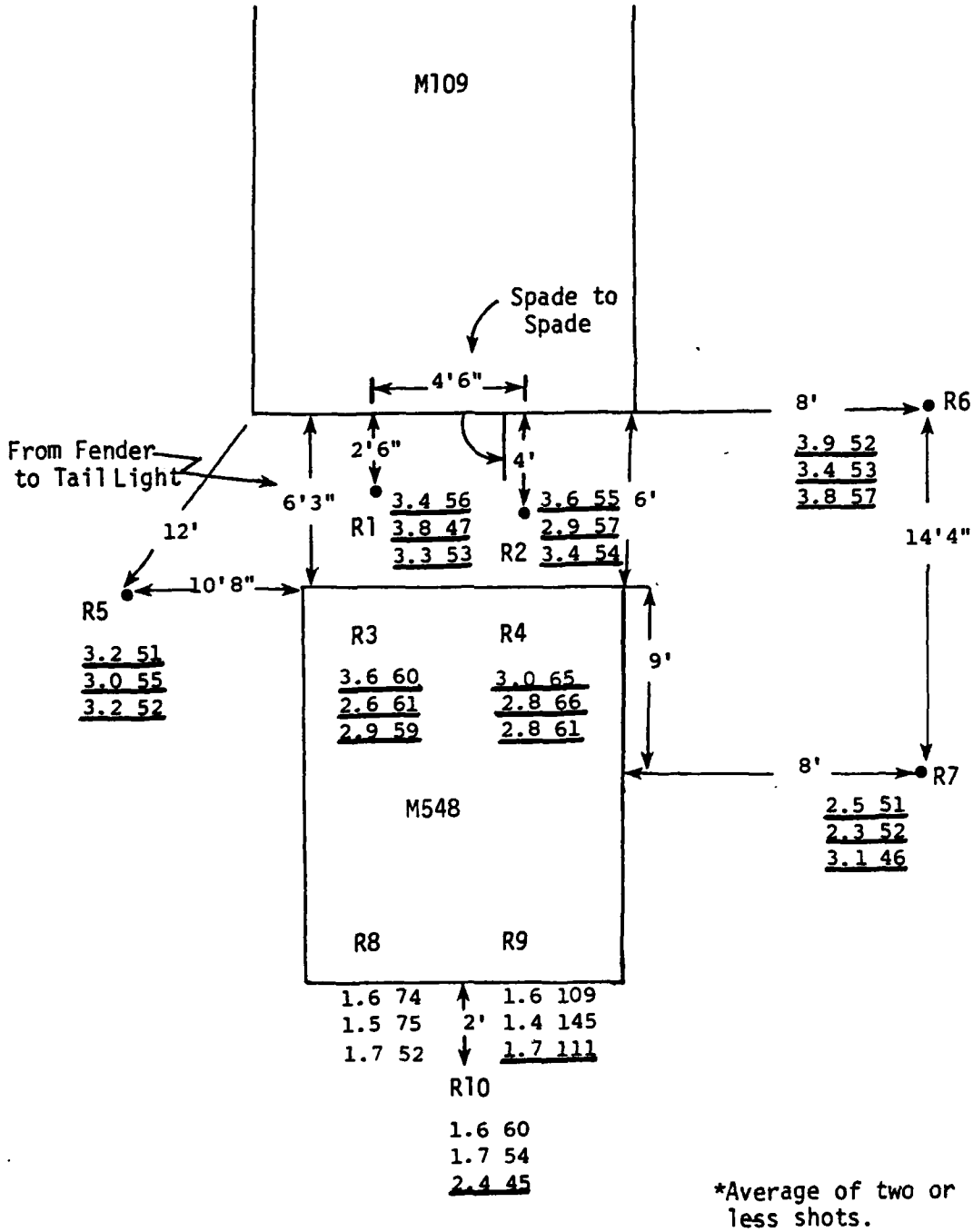


Figure 2-6

INTERIOR GAUGES M109
16 MAY 1979

	FRONT LEFT	FRONT RIGHT	REAR LEFT	REAR RIGHT
All Hatches Closed	0.5 - 0.5 -* 0.7 256	0.7 236 0.7 258* 0.8 228	0.7 308 0.7 - 0.7 232	0.6 - 0.5 - 0.4 -
Rear Hatch Open All Others Closed	1.2 244 1.2 218 1.1 210	1.4 1.4 - 1.3 249	1.1 272 1.1 256 0.9 -	0.9 - 0.9 205 0.9 226
Side and Rear Hatches Open	1.5 200 1.6 207 1.3 234	1.5 281 1.5 246 1.6 174	1.5 - 1.5 177 1.7 135	1.6 150 1.2 218 1.0 204
All Hatches But Driver Open	1.5 220 2.0 179 1.7 188	2.4 141 1.8 203 1.8 199	2.0 285 - - 3.1 54*	2.7 88 2.2 101 1.3 174

*Average of two or less shots.

Table 2-3. Interior Gauges

M109 16 MAY 79 ABERDEEN

SHOT	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	QE/AZ
	0/40		0/30		0/20		0/10		FL		FR		RL		RR		R1		R2		
1	0.5	103.	2.1	95.	1.0	0.	1.8	221.	1.1	154.	1.5	118.	1.5	124.	1.1	0.	3.1	57.	3.6	57.	1225/0
2	0.5	71.	0.8	56.	0.9	69.	1.7	55.	0.4	0.	0.7	311.	0.6	311.	0.7	0.	3.2	56.	3.4	56.	
3	0.5	69.	0.9	55.	0.9	68.	1.9	52.	0.5	301.	0.8	174.	0.7	301.	0.5	0.	3.5	54.	3.9	50.	
4	0.5	61.	0.7	69.	0.9	68.	1.7	56.	0.5	169.	0.7	222.	0.7	311.	0.5	311.	3.4	58.	3.4	58.	
	0.5	67.	0.8	60.	0.9	68.	1.8	54.	0.5	---	0.7	236.	0.7	308.	0.6	---	3.4	56.	3.6	55.	SHOT 1 IGNORED
5	0.5	403.	0.7	0.	1.0	170.	2.2	64.	0.5	200.	0.7	208.	0.7	169.	0.5	0.	4.1	46.	2.9	57.	510/0
6	0.5	94.	0.8	75.	1.1	68.	2.4	53.	---	---	---	---	0.7	0.	0.5	0.	3.5	46.	3.0	57.	
7	0.4	303.	0.8	67.	1.1	69.	1.8	64.	0.5	0.	0.7	307.	0.6	310.	0.5	312.	3.7	50.	2.8	57.	
	0.5	230.	0.8	---	1.1	102.	2.1	60.	0.5	---	0.7	258.	0.7	---	0.5	---	3.8	47.	2.9	57.	
8	2.0	36.	2.1	84.	---	---	4.7	70.	0.6	311.	0.8	176.	0.6	309.	0.4	0.	3.3	48.	3.5	57.	40/0
9	2.0	122.	2.8	151.	2.5	75.	3.8	59.	0.5	311.	0.7	347.	0.6	246.	0.5	0.	3.3	54.	3.4	48.	
10	1.8	54.	2.1	83.	2.0	130.	4.9	98.	0.9	147.	0.9	161.	1.0	141.	0.4	0.	3.4	58.	3.4	57.	
	1.9	71.	2.3	106.	2.3	103.	4.5	76.	0.7	256.	0.8	228.	0.7	232.	0.4	---	3.3	53.	3.4	54.	
	30/40		30/30		30/20		30/10		FL		FR		RL		RR		R3		R4		
11	0.6	53.	0.8	54.	1.0	72.	1.7	53.	1.3	193.	1.5	225.	1.0	197.	1.0	0.	3.8	60.	3.2	64.	1225/0
12	0.6	54.	0.9	54.	0.9	72.	1.8	53.	1.2	310.	1.3	0.	1.2	309.	0.7	312.	3.5	60.	2.9	65.	
13	0.6	54.	0.9	54.	1.0	62.	1.8	50.	1.2	230.	1.4	208.	1.2	309.	1.0	180.	3.6	60.	2.9	65.	
	0.6	54.	0.9	54.	1.0	69.	1.8	52.	1.2	244.	1.4	---	1.1	272.	0.9	---	3.6	60.	3.0	65.	
14	0.7	63.	1.0	55.	1.3	54.	2.8	49.	1.3	215.	1.4	179.	1.1	236.	0.9	214.	2.6	64.	3.3	63.	510/0
15	0.7	56.	0.9	59.	1.2	55.	2.4	52.	1.1	206.	1.4	0.	1.1	306.	0.9	215.	2.7	59.	2.5	68.	
16	0.6	59.	0.9	67.	1.2	63.	2.4	52.	1.2	233.	1.4	208.	1.0	225.	0.9	187.	2.5	61.	2.5	67.	
	0.7	59.	0.9	60.	1.2	57.	2.5	51.	1.2	218.	1.4	---	1.1	256.	0.9	205.	2.6	61.	2.8	66.	
17	0.7	55.	0.8	60.	1.2	69.	2.9	54.	1.2	210.	1.3	221.	0.9	311.	0.9	220.	3.0	59.	2.8	63.	40/0
18	0.7	60.	0.8	84.	1.3	63.	3.4	52.	1.0	212.	1.2	217.	0.9	0.	0.9	249.	2.9	59.	2.8	60.	
19	0.7	60.	0.8	67.	1.3	58.	3.0	51.	1.2	208.	1.3	309.	0.9	0.	0.8	210.	2.8	59.	2.8	59.	
	0.7	58.	0.8	70.	1.3	63.	3.1	52.	1.1	210.	1.3	249.	0.9	---	0.9	226.	2.9	59.	2.8	61.	
	60/40		60/30		60/20		60/10		FL		FR		RL		RR		R5		R6		
20	0.6	61.	0.8	62.	1.3	59.	1.9	50.	1.6	145.	1.6	311.	1.5	129.	1.6	135.	3.5	48.	3.9	53.	1225/0
21	0.5	61.	0.8	61.	1.3	49.	1.9	56.	1.5	219.	1.5	220.	1.5	301.	1.5	136.	3.2	51.	3.9	52.	
22	0.5	51.	0.8	61.	1.3	49.	1.9	50.	1.5	236.	1.5	312.	1.5	0.	1.6	178.	3.0	53.	3.9	52.	
	0.5	58.	0.8	61.	1.3	52.	1.9	52.	1.5	200.	1.5	281.	1.5	---	1.6	150.	3.2	51.	3.9	52.	
23	0.7	57.	1.0	58.	1.5	52.	2.5	56.	1.7	210.	1.4	216.	1.6	197.	1.4	136.	3.0	55.	3.4	54.	510/0
24	0.6	58.	1.0	58.	1.4	58.	2.6	55.	1.5	207.	1.4	215.	1.4	153.	1.1	208.	3.2	55.	3.2	54.	
25	0.7	52.	1.0	55.	1.5	51.	2.5	53.	1.7	204.	1.6	308.	1.4	182.	1.1	310.	2.9	55.	3.7	50.	
	0.7	56.	1.0	57.	1.5	54.	2.5	55.	1.6	207.	1.5	246.	1.5	177.	1.2	218.	3.0	55.	3.4	53.	

Table 2-4. M109 - 16 May

26	0.6	56.	1.0	55.	1.8	48.	3.2	46.	1.3	237.	1.6	204.	1.8	116.	1.1	205.	3.0	51.	3.7	58.	40/0
27	0.6	58.	1.0	56.	1.9	42.	3.4	49.	1.3	230.	1.6	141.	1.6	129.	1.0	210.	3.7	52.	3.9	56.	
28	0.6	58.	1.0	55.	1.9	42.	3.8	41.	1.3	234.	1.6	178.	1.8	160.	0.9	197.	2.9	53.	3.7	56.	
	0.6	57.	1.0	55.	1.9	44.	3.5	45.	1.3	234.	1.6	174.	1.7	135.	1.0	204.	3.2	52.	3.8	57.	

	90/40		90/30		90/20		90/10		FL		FR		RL		RR		R10		R7		
29	0.7	53.	1.1	55.	1.8	45.	2.6	45.	1.4	199.	2.3	146.	1.8	312.	2.8	83.	1.6	60.	2.5	51.	1225/0
30	0.7	55.	1.1	56.	1.6	54.	2.5	56.	1.5	221.	2.4	142.	1.9	312.	2.5	101.	1.6	60.	2.6	51.	
31	0.6	57.	1.0	56.	1.7	52.	2.7	45.	1.5	239.	2.4	136.	2.2	232.	2.7	81.	1.5	61.	2.5	50.	
	0.7	55.	1.1	56.	1.7	50.	2.6	49.	1.5	220.	2.4	141.	2.0	285.	2.7	88.	1.6	60.	2.5	51.	
32	0.7	47.	1.0	58.	2.2	37.	3.3	45.	2.0	198.	1.8	245.	4.6	58.	2.4	59.	1.7	50.	2.3	50.	510/0
33	0.7	59.	1.0	56.	2.1	46.	3.5	47.	2.0	200.	1.9	150.	4.6	58.	2.1	130.	1.7	55.	2.3	55.	
34	0.7	58.	1.0	59.	2.1	50.	3.1	52.	2.0	140.	1.8	213.	4.6	58.	2.1	114.	1.7	56.	2.3	50.	
	0.7	55.	1.0	58.	2.1	44.	3.3	48.	2.0	179.	1.8	203.	4.6	58.	2.2	101.	1.7	54.	2.3	52.	
35	0.6	62.	1.0	64.	2.4	34.	4.2	36.	1.7	219.	1.8	215.	3.1	53.	1.7	150.	2.4	45.	2.9	46.	40/0
36	0.7	62.	1.0	63.	2.6	36.	5.0	36.	1.7	154.	1.7	213.	3.2	56.	1.1	185.	2.5	45.	3.4	46.	
37	0.7	58.	1.0	65.	2.6	35.	4.4	42.	1.7	192.	1.9	169.	3.0	53.	1.1	184.	2.4	46.	3.0	47.	
	0.7	58.	1.0	64.	2.5	35.	4.5	38.	1.7	188.	1.8	199.	3.1	54.	1.3	174.	2.4	45.	3.1	46.	

	120/40		120/30		120/20		120/10		150/40		150/30		150/20		150/10		R8		R9		
38	0.8	59.	1.1	59.	2.1	49.	---	---	0.8	52.	1.5	50.	1.6	54.	1.3	150.	1.6	57.	1.6	85.	1225/0
39	0.7	59.	1.0	60.	2.1	49.	---	---	0.8	53.	1.5	53.	1.8	53.	1.6	303.	1.6	62.	1.7	86.	
40	0.7	60.	1.0	60.	2.0	44.	---	---	0.9	54.	1.5	52.	1.6	55.	1.5	94.	1.6	102.	1.5	157.	
	0.7	59.	1.0	60.	2.1	47.	---	---	0.8	53.	1.5	52.	1.7	54.	1.5	182.	1.6	74.	1.6	109.	
41	0.7	61.	1.0	57.	2.3	47.	---	---	0.9	52.	1.5	51.	1.8	52.	---	---	1.5	107.	1.4	158.	510/0
42	0.7	61.	1.1	56.	2.3	43.	---	---	0.9	52.	1.3	52.	1.5	52.	---	---	1.5	59.	1.3	163.	
43	0.7	59.	1.0	56.	2.3	46.	---	---	0.9	53.	1.2	53.	1.5	53.	1.5	228.	1.6	59.	1.4	114.	
	0.7	60.	1.0	56.	2.3	45.	---	---	0.9	52.	1.3	52.	1.6	52.	1.5	228.	1.5	75.	1.4	145.	
44	0.7	60.	1.1	58.	2.8	42.	---	---	0.8	53.	1.3	52.	1.9	53.	1.5	111.	1.7	51.	1.7	112.	40/0
45	0.7	61.	1.0	59.	2.8	40.	---	---	0.9	54.	1.3	53.	1.9	54.	1.5	132.	1.7	50.	1.7	118.	
46	0.7	60.	1.1	59.	2.9	44.	---	---	0.9	51.	1.4	50.	1.9	50.	1.5	164.	1.8	56.	1.8	102.	
	0.7	60.	1.1	58.	2.8	42.	---	---	0.9	53.	1.3	52.	1.9	52.	1.5	136.	1.7	52.	1.7	111.	

Table 2-4 (Continued)

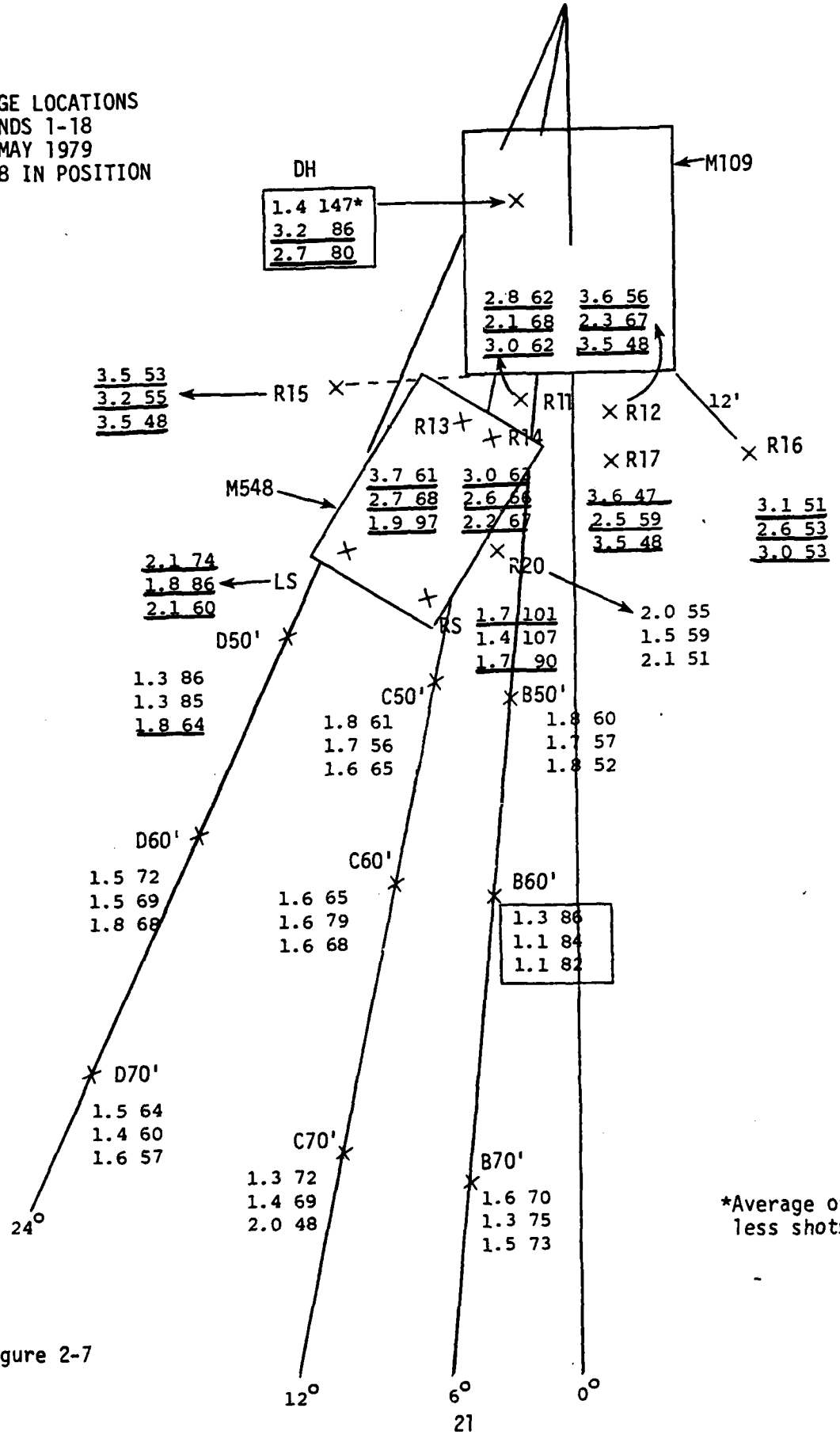
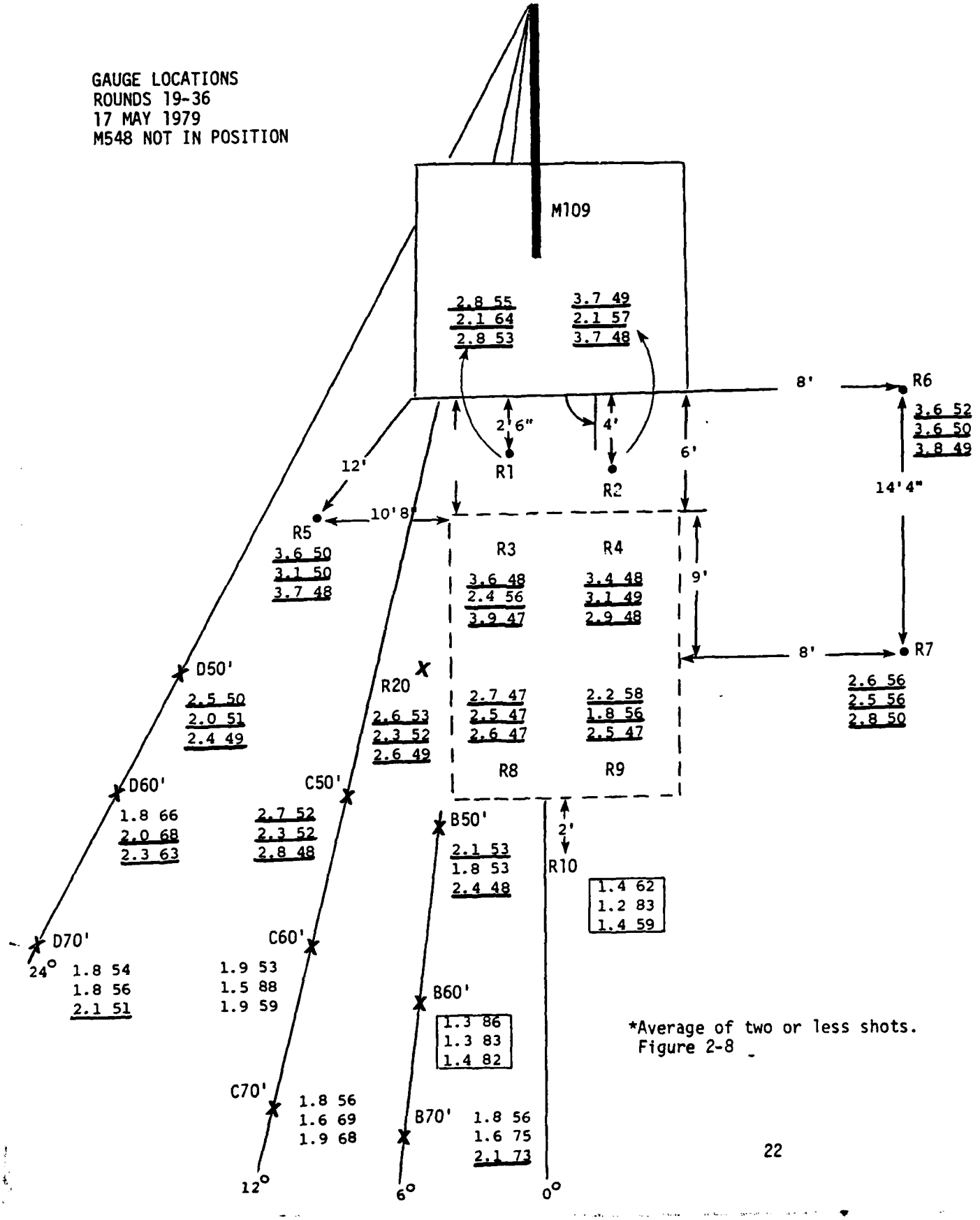
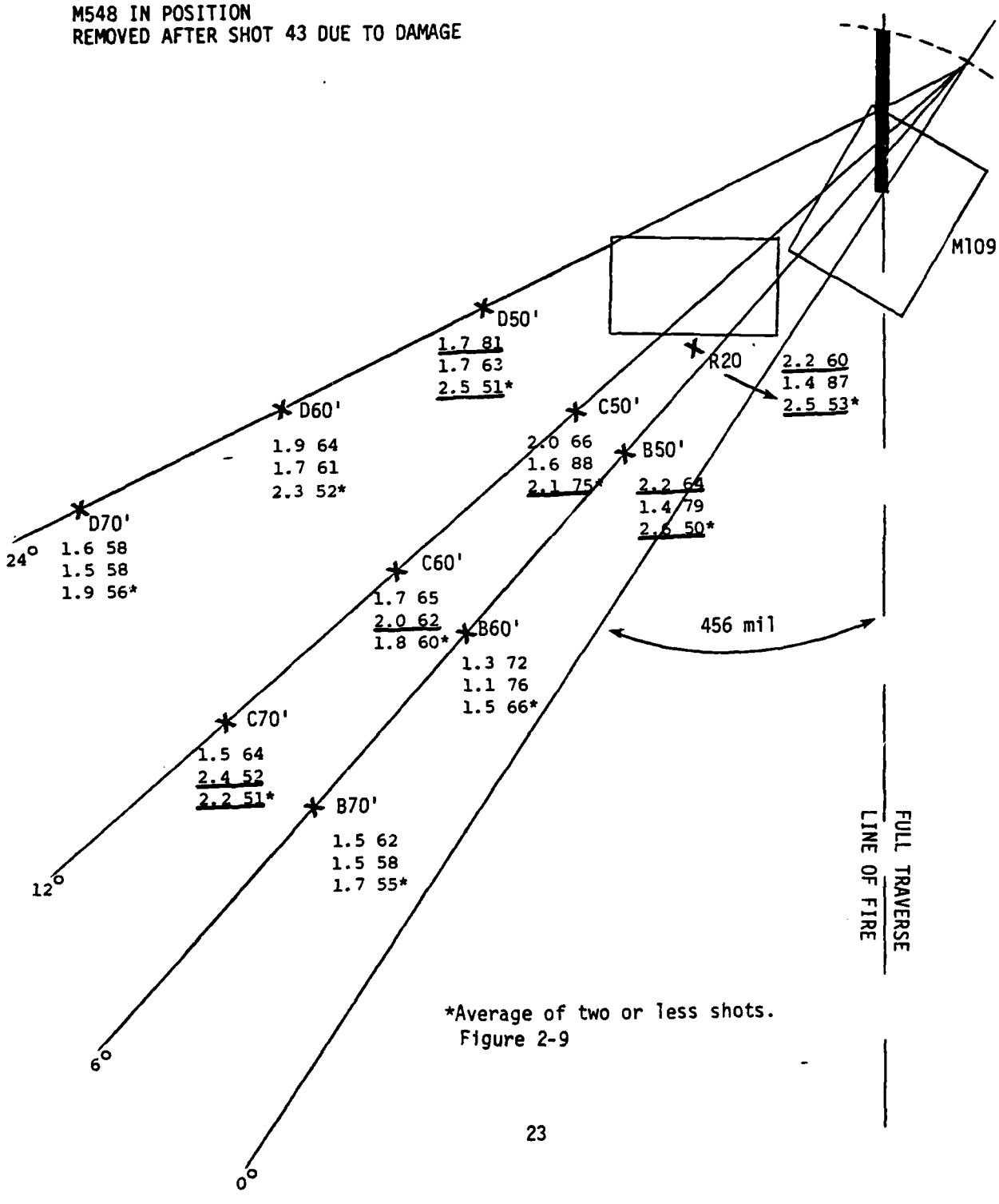

GAUGE LOCATIONS
ROUNDS 1-18
17 MAY 1979
M548 IN POSITION
DH
1.4 147*
3.2 86
2.7 80
M109
2.8 62
2.1 68
3.0 62
3.6 56
2.3 67
3.5 48
3.5 53
3.2 55
3.5 48
R15
R11
R12
R13
R14
R17
12'
R16
3.1 51
2.6 53
3.0 53
M548
3.7 61
2.7 68
1.9 97
3.0 62
2.6 66
2.2 67
3.6 47
2.5 59
3.5 48
2.1 74
1.8 86
2.1 60
LS
R20
2.0 55
1.5 59
2.1 51
RS
1.7 101
1.4 107
1.7 90
D50'
1.3 86
1.3 85
1.8 64
C50'
1.8 61
1.7 56
1.6 65
B50'
1.8 60
1.7 57
1.8 52
D60'
1.5 72
1.5 69
1.8 68
C60'
1.6 65
1.6 79
1.6 68
B60'
1.3 86
1.1 84
1.1 82
D70'
1.5 64
1.4 60
1.6 57
C70'
1.3 72
1.4 69
2.0 48
B70'
1.6 70
1.3 75
1.5 73
24°
12°
6°
0°
21
*Average of two or less shots.

Figure 2-7



*Average of two or less shots.
Figure 2-8

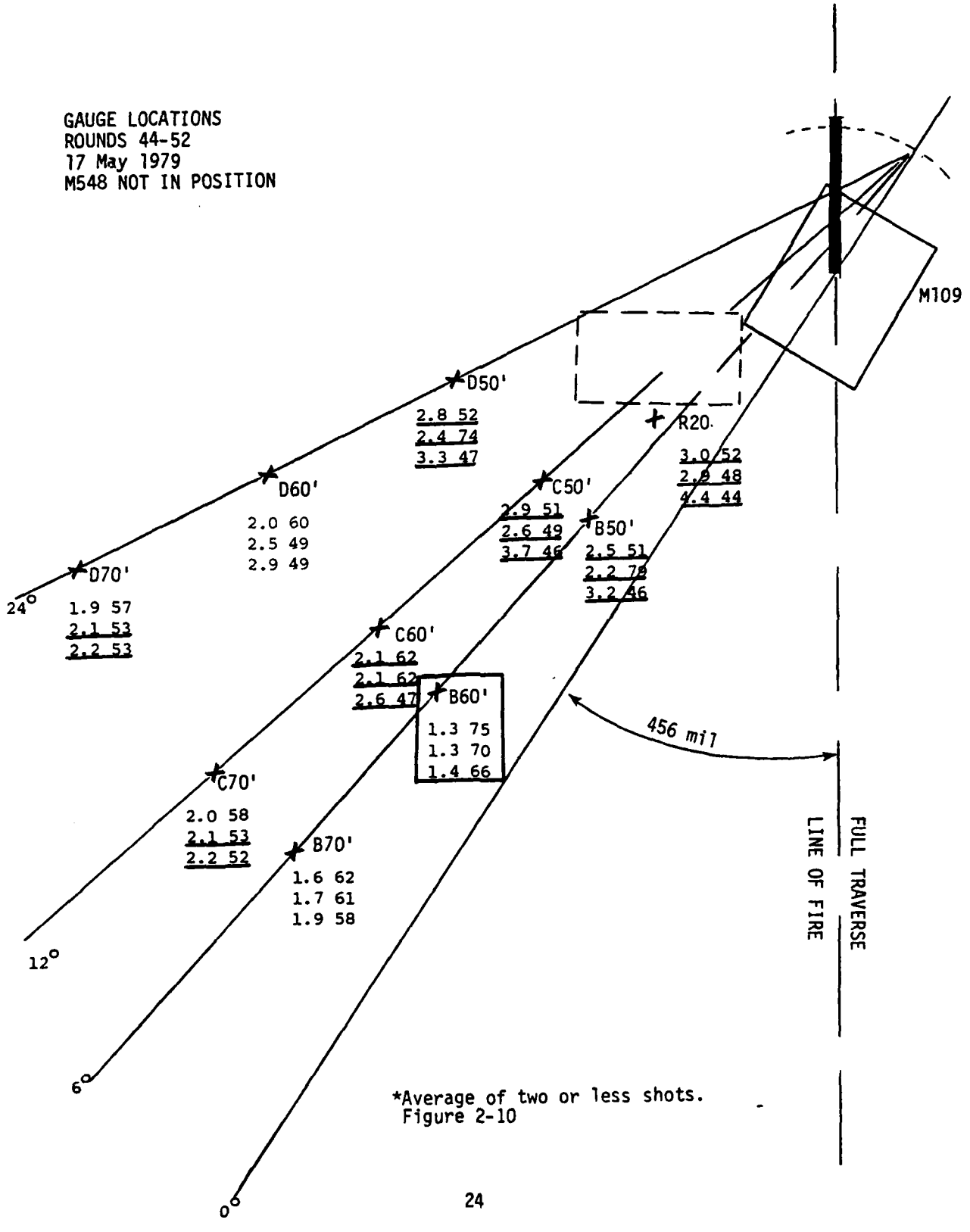
GAUGE LOCATIONS
ROUNDS 37-43
17 MAY 1979
M548 IN POSITION
REMOVED AFTER SHOT 43 DUE TO DAMAGE



*Average of two or less shots.

Figure 2-9

GAUGE LOCATIONS
ROUNDS 44-52
17 May 1979
M548 NOT IN POSITION



*Average of two or less shots.
Figure 2-10

GAUGE LOCATIONS
ROUNDS 53-61
17 MAY 1979
M548 NOT PRESENT

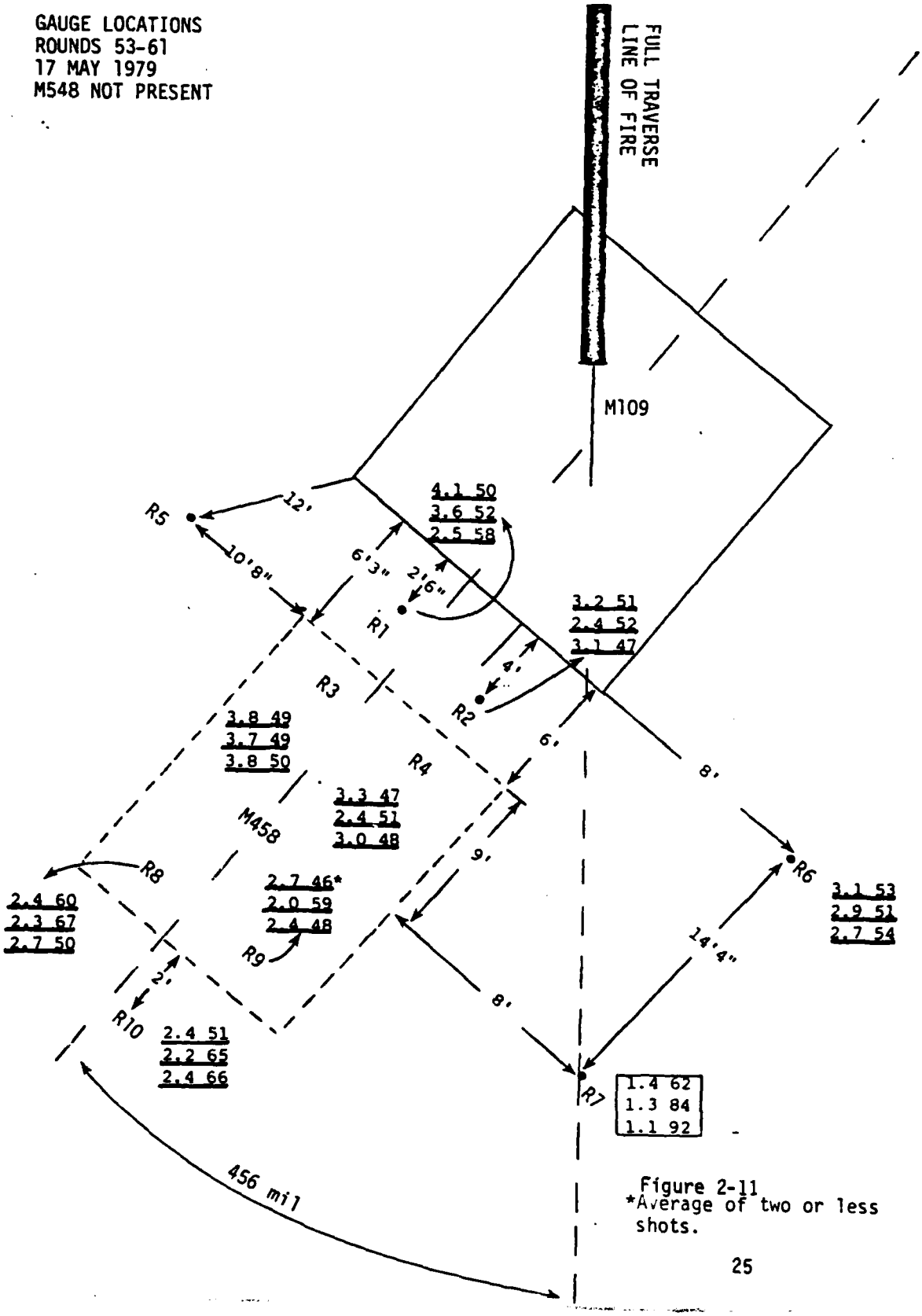


Figure 2-11
*Average of two or less shots.

17 MAY 79 M109 FIRINGS ABERDEEN PROVING GROUNDS

SHOT	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	
	R11		R12		R15		R17		R16		R14		R11		DH		RS		LS		
1	3.4	61.	3.6	57.	3.7	52.	3.5	47.	3.1	49.	2.8	65.	2.7	61.	1.3	0.	1.6	105.	2.0	65.	1225/0
2	3.6	61.	3.3	58.	3.6	52.	3.5	46.	3.5	51.	3.0	62.	3.0	63.	1.3	140.	1.7	119.	2.2	66.	
3	3.8	62.	4.0	52.	3.3	54.	3.8	48.	2.8	54.	3.1	63.	2.7	63.	1.5	153.	1.7	78.	2.0	90.	
	3.7	61.	3.6	56.	3.5	53.	3.6	47.	3.1	51.	3.0	63.	2.8	62.	1.4	147.	1.7	101.	2.1	74.	
4	2.8	66.	2.3	64.	3.0	50.	2.8	54.	2.7	53.	2.8	62.	2.1	67.	---	---	1.4	120.	1.8	94.	510/0
5	2.5	71.	2.7	68.	2.9	47.	2.4	67.	2.4	53.	2.3	69.	2.0	69.	3.0	85.	1.4	101.	1.8	94.	
6	2.7	67.	2.3	67.	3.7	49.	2.3	55.	2.6	54.	2.6	66.	2.1	67.	3.4	86.	1.4	101.	1.8	71.	
	2.7	68.	2.3	67.	3.2	55.	2.5	59.	2.6	53.	2.6	66.	2.1	68.	3.2	86.	1.4	107.	1.8	86.	
7	1.9	105.	3.5	48.	3.5	47.	3.6	47.	2.8	53.	2.2	76.	2.9	62.	3.1	66.	1.8	111.	2.0	59.	40/0
8	1.9	82.	3.6	48.	3.7	47.	3.4	48.	3.4	52.	2.2	62.	3.1	61.	2.9	82.	1.7	71.	2.2	53.	
9	1.8	103.	3.4	49.	3.4	50.	3.5	48.	2.8	54.	2.1	64.	3.1	62.	2.2	92.	1.6	88.	2.2	67.	
	1.9	97.	3.5	48.	3.5	48.	3.5	48.	3.0	53.	2.2	67.	3.0	62.	2.7	80.	1.7	90.	2.1	51.	
	D70		D60		D50		C70		C60		C50		B70		B60		B50		R20		
10	1.5	64.	1.5	75.	1.3	80.	1.4	72.	1.7	56.	1.9	62.	1.6	56.	1.3	86.	1.9	62.	2.0	54.	1225/0
11	1.3	64.	1.4	71.	1.3	93.	1.3	72.	1.5	81.	1.7	59.	1.5	77.	1.3	86.	1.8	57.	1.9	54.	
12	1.6	64.	1.5	71.	1.3	85.	1.3	72.	1.7	58.	1.7	61.	1.6	77.	1.3	86.	1.7	61.	2.0	58.	
	1.5	64.	1.5	72.	1.3	86.	1.3	72.	1.6	65.	1.8	61.	1.6	70.	1.3	86.	1.8	60.	2.0	55.	
13	1.4	60.	1.5	69.	1.3	88.	1.4	69.	1.6	79.	1.8	54.	1.3	75.	1.1	84.	1.7	56.	1.4	61.	510/0
14	1.4	61.	1.5	69.	1.3	83.	1.4	70.	1.7	79.	1.8	57.	1.3	75.	1.1	84.	1.8	57.	1.6	59.	
15	1.5	59.	1.5	69.	1.4	83.	1.5	69.	1.6	79.	1.6	56.	1.4	75.	1.1	84.	1.5	59.	1.9	57.	
	1.4	60.	1.5	69.	1.3	85.	1.4	69.	1.6	79.	1.7	56.	1.3	75.	1.1	84.	1.7	57.	1.5	59.	
16	1.6	58.	1.7	69.	1.7	59.	1.9	49.	1.6	77.	1.5	56.	1.4	73.	1.1	82.	1.7	55.	2.1	52.	40/0
17	1.6	59.	1.8	69.	1.6	52.	2.0	48.	1.6	77.	1.7	51.	1.5	73.	1.1	82.	1.8	50.	2.1	50.	
18	1.7	55.	1.9	68.	1.9	82.	2.1	47.	1.7	49.	1.5	88.	1.5	72.	1.1	82.	1.8	50.	2.0	52.	
	1.6	57.	1.8	69.	1.8	64.	2.0	48.	1.6	68.	1.6	65.	1.5	73.	1.1	82.	1.8	52.	2.1	51.	
M548 MOVED OUT																					
	D70		D60		D50		C70		C60		C50		B70		R60		B50		R20		
19	1.8	55.	1.7	71.	2.4	50.	1.7	61.	1.9	57.	2.8	52.	1.8	57.	1.3	86.	2.2	51.	2.7	53.	1225/0
20	1.7	54.	1.8	71.	2.6	50.	1.9	52.	1.9	52.	2.6	54.	1.8	53.	1.3	86.	2.2	50.	2.6	52.	
21	1.9	54.	2.0	57.	2.6	50.	1.9	56.	1.9	50.	2.8	50.	1.8	58.	1.3	86.	2.0	57.	2.6	53.	
	1.8	54.	1.8	66.	2.5	50.	1.8	56.	1.9	53.	2.7	52.	1.8	56.	1.3	86.	2.1	53.	2.6	53.	
22	1.8	56.	2.0	68.	1.9	52.	1.8	69.	1.5	83.	2.2	51.	1.6	75.	1.3	83.	1.8	52.	2.1	55.	510/0
23	1.9	56.	2.0	68.	2.1	50.	1.8	69.	1.5	79.	2.3	52.	1.6	75.	1.3	83.	1.9	53.	2.5	49.	
24	1.8	57.	1.9	69.	2.0	50.	1.8	69.	1.6	103.	2.3	53.	1.7	75.	1.2	84.	1.7	55.	2.2	53.	
	1.8	56.	2.0	68.	2.0	51.	1.8	69.	1.5	88.	2.3	52.	1.6	75.	1.3	83.	1.8	53.	2.1	52.	

Table 2-5. M109 - 17 May

25	2.1	56.	2.4	68.	2.4	49.	2.8	68.	1.9	77.	3.0	47.	2.0	73.	1.4	82.	2.8	46.	2.6	48.	40/0
26	2.1	50.	2.2	68.	2.3	49.	1.9	68.	1.9	51.	2.8	50.	2.1	73.	1.4	82.	2.2	50.	2.7	50.	
27	2.1	48.	2.2	52.	2.5	48.	1.9	68.	1.9	48.	2.5	49.	2.1	73.	1.4	82.	2.2	49.	2.6	49.	
	2.1	51.	2.3	61.	2.4	49.	1.9	68.	1.9	59.	2.8	48.	2.1	73.	1.4	82.	2.4	48.	2.6	49.	

	R5		R3		R1		RR		R4		R2		R7		R10		R9		R6		
28	3.7	48.	3.5	44.	2.8	57.	2.6	46.	3.1	48.	3.7	47.	2.6	56.	1.3	62.	2.1	56.	3.6	53.	1225/0
29	3.4	54.	3.5	48.	2.7	56.	2.5	49.	3.6	47.	3.8	52.	2.7	55.	1.4	63.	2.3	60.	3.5	54.	
30	3.8	49.	3.7	47.	2.9	51.	2.9	45.	3.4	48.	3.7	48.	2.6	56.	1.4	61.	2.3	57.	3.8	50.	
	3.6	50.	3.6	48.	2.8	55.	2.7	47.	3.4	48.	3.7	49.	2.6	56.	1.4	62.	2.2	58.	3.6	52.	
31	3.2	51.	2.4	56.	2.3	65.	2.5	47.	3.1	49.	2.2	56.	2.7	55.	1.3	60.	1.8	56.	3.9	53.	510/0
32	3.2	48.	2.4	55.	2.1	64.	2.5	47.	3.2	52.	2.0	58.	2.5	55.	1.2	95.	1.8	55.	3.5	50.	
33	3.0	51.	2.5	57.	2.0	64.	2.4	46.	3.1	46.	2.1	58.	2.4	57.	1.2	95.	1.8	56.	3.5	47.	
	3.1	50.	2.4	56.	2.1	64.	2.5	47.	3.1	49.	2.1	57.	2.5	56.	1.2	83.	1.8	56.	3.6	50.	
34	3.7	49.	3.9	48.	2.8	49.	2.6	47.	2.8	49.	3.6	49.	2.7	51.	1.4	59.	2.3	48.	3.7	50.	40/0
35	3.6	50.	3.9	47.	2.9	50.	2.6	47.	2.9	48.	3.7	49.	2.9	51.	1.4	59.	2.8	47.	3.8	51.	
36	3.9	46.	3.8	46.	2.7	59.	2.6	47.	2.9	48.	3.7	47.	2.9	49.	1.4	60.	2.6	47.	4.0	47.	
	3.7	48.	3.9	47.	2.8	53.	2.6	47.	2.9	48.	3.7	48.	2.8	50.	1.4	59.	2.5	47.	3.8	49	

AZ CHANGED. M54R REPLACED.

	D70		D60		D50		C70		C60		C50		B70		B60		B50		R20		
37	1.7	57.	1.8	64.	1.6	76.	1.5	64.	1.7	65.	1.8	78.	1.3	62.	1.3	67.	2.1	55.	1.9	64.	1225/450
38	1.7	58.	1.9	64.	1.8	61.	1.5	64.	1.6	65.	2.1	62.	1.5	62.	1.3	81.	2.1	80.	2.5	58.	
39	1.5	59.	1.9	64.	1.8	106.	1.5	64.	1.7	65.	2.2	59.	1.6	62.	1.4	67.	2.4	56.	2.3	58.	
	1.6	58.	1.9	64.	1.7	81.	1.5	64.	1.7	65.	2.0	66.	1.5	62.	1.3	72.	2.2	64.	2.2	60.	
40	1.5	58.	1.8	62.	1.8	55.	2.3	52.	1.9	62.	1.5	89.	1.6	57.	1.0	79.	1.3	79.	1.4	87.	510/450
41	1.5	58.	1.7	57.	1.7	53.	2.4	52.	2.1	62.	1.8	77.	1.4	58.	1.1	71.	1.5	79.	1.5	87.	
42	1.6	58.	1.7	64.	1.7	80.	2.4	52.	1.9	62.	1.6	97.	1.6	58.	1.1	79.	1.5	79.	1.4	87.	
	1.5	58.	1.7	61.	1.7	63.	2.4	52.	2.0	62.	1.6	88.	1.5	58.	1.1	76.	1.4	79.	1.4	87.	
43	1.9	56.	2.3	52.	2.5	51.	2.2	51.	1.8	60.	2.1	75.	1.7	55.	1.5	66.	2.6	50.	2.5	53.	40/450

M54R DAMAGED AND REMOVED.

	D70		D60		D50		C70		C60		C50		B70		B60		B50		R20		
44	2.0	57.	2.1	59.	2.8	53.	2.0	56.	2.2	65.	3.0	51.	1.6	62.	1.3	72.	2.7	51.	3.0	52.	1225/450
45	1.8	56.	2.1	63.	2.6	54.	1.9	57.	1.9	55.	2.8	52.	1.5	63.	1.3	73.	2.3	92.	3.0	52.	
46	1.8	57.	1.9	59.	3.0	49.	2.0	62.	2.1	65.	2.9	49.	1.6	61.	1.3	80.	2.6	49.	2.9	51.	
	1.9	57.	2.0	60.	2.8	52.	2.0	58.	2.1	62.	2.9	51.	1.6	62.	1.3	75.	2.5	51.	3.0	52.	

Table 2-5 (Continued)

47	2.3	52.	2.7	47.	2.5	52.	2.0	53.	2.0	62.	2.9	50.	1.7	62.	1.3	69.	2.0	79.	2.8	49.	510/450
48	2.0	52.	2.4	50.	2.4	66.	2.2	53.	2.2	62.	2.8	48.	1.7	62.	1.3	70.	2.1	79.	2.8	48.	
49	1.9	56.	2.3	49.	2.2	104.	2.0	53.	2.0	63.	2.6	48.	1.6	58.	1.3	70.	2.4	79.	3.1	46.	
	2.1	53.	2.5	49.	2.4	74.	2.1	53.	2.1	62.	2.6	49.	1.7	61.	1.3	70.	2.2	79.	2.9	48.	
50	2.2	58.	2.7	52.	3.2	50.	2.2	52.	2.8	47.	3.7	46.	2.0	56.	1.4	68.	3.3	46.	4.6	41.	40/450
51	2.3	52.	2.8	46.	3.3	48.	2.2	51.	2.7	47.	3.8	47.	1.9	62.	1.4	67.	3.1	47.	4.3	46.	
52	2.2	50.	3.1	45.	3.5	43.	2.2	53.	2.4	47.	3.7	46.	1.9	57.	1.4	64.	3.3	45.	4.4	44.	
	2.2	53.	2.9	48.	3.3	47.	2.2	52.	2.6	47.	3.7	46.	1.9	58.	1.4	66.	3.2	46.	4.4	44.	

	R10		R8		R5		R9		R4		R3		R6		R7		R2		R1		
53	2.4	54.	2.3	55.	---	---	0.0	0.	3.3	47.	4.0	49.	3.1	52.	1.4	62.	3.6	49.	3.9	56.	1225/450
54	2.4	53.	2.3	79.	---	---	2.6	46.	3.2	48.	3.6	49.	3.0	55.	1.4	63.	3.0	53.	4.2	48.	
55	2.4	46.	2.5	47.	---	---	2.7	45.	3.3	47.	3.8	49.	3.2	53.	1.4	61.	3.2	52.	4.2	48.	
	2.4	51.	2.4	60.	---	---	2.7	46.	3.3	47.	3.8	49.	3.1	53.	1.4	62.	3.2	51.	4.1	50.	
56	2.0	75.	2.0	77.	---	---	1.9	48.	2.3	50.	3.5	48.	3.0	52.	1.3	94.	2.3	54.	3.7	56.	510/450
57	2.0	75.	2.3	77.	---	---	1.9	81.	2.6	51.	3.7	51.	2.8	48.	1.3	63.	2.6	51.	3.4	51.	
58	2.5	44.	2.6	46.	---	---	2.2	49.	2.4	51.	3.8	48.	3.0	52.	1.3	94.	2.5	51.	3.6	50.	
	2.2	65.	2.3	67.	---	---	2.0	59.	2.4	51.	3.7	49.	2.9	51.	1.3	84.	2.4	52.	3.8	52.	
59	2.5	74.	2.8	50.	---	---	2.5	49.	3.0	48.	3.9	49.	2.7	55.	1.1	92.	3.1	48.	2.5	69.	40/450
60	2.4	49.	2.7	50.	---	---	2.4	47.	3.0	48.	3.8	51.	2.5	56.	1.1	92.	3.2	47.	2.4	61.	
61	2.4	74.	2.6	49.	---	---	2.2	48.	3.1	48.	3.7	51.	2.8	52.	1.1	92.	3.1	47.	2.7	51.	
	2.4	66.	2.7	50.	---	---	2.4	48.	3.0	48.	3.8	50.	2.7	54.	1.1	92.	3.1	47.	2.5	58.	

Table 2-5a (Continued)

18 MAY 79 M198 ABERDEEN PG

SHOT	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	MAX	BDUR	QE/AZ
	A50		A40		A35		A30		A25		C50		C40		C35		C30		C22		
1	1.4	71.	1.6	45.	1.8	66.	2.1	42.	2.1	43.	1.1	76.	1.3	179.	1.4	41.	1.7	48.	2.4	44.	800/0
2	1.5	71.	1.7	37.	1.8	43.	2.0	41.	2.2	41.	1.1	77.	1.4	40.	1.4	43.	1.8	42.	2.6	44.	
3	1.3	71.	1.6	65.	1.8	65.	2.0	69.	2.1	60.	1.1	76.	1.2	112.	1.2	92.	1.9	61.	2.2	61.	
	1.4	71.	1.6	49.	1.8	58.	2.0	51.	2.1	48.	1.1	76.	1.3	110.	1.3	59.	1.8	50.	2.4	50.	
4	1.3	71.	1.5	45.	1.7	38.	1.8	52.	2.1	47.	1.3	96.	1.4	47.	1.2	54.	1.6	53.	2.2	49.	267/0
5	1.2	71.	1.5	61.	1.9	49.	2.1	52.	2.1	60.	1.3	95.	1.3	86.	1.2	93.	1.7	61.	2.7	53.	
6	1.6	70.	1.8	47.	2.1	49.	2.5	47.	2.8	49.	1.5	76.	1.7	51.	1.3	56.	2.3	57.	3.2	50.	
7	1.2	71.	1.5	44.	1.8	57.	1.9	55.	2.2	58.	1.5	76.	1.3	67.	1.2	93.	1.8	56.	2.6	50.	
	1.2	71.	1.5	61.	1.8	48.	1.9	51.	2.1	55.	1.4	89.	1.3	67.	1.2	80.	1.7	57.	2.5	51.	
8	1.3	70.	1.9	34.	2.0	37.	2.5	36.	2.4	40.	1.3	76.	1.7	35.	1.3	39.	2.6	37.	2.6	37.	45/0
9	1.3	70.	1.9	56.	2.1	52.	2.4	53.	2.3	59.	1.4	76.	1.8	53.	1.4	59.	3.0	50.	2.6	54.	
10	1.3	70.	1.9	35.	2.0	35.	2.5	36.	2.6	39.	1.3	76.	1.8	37.	1.3	55.	2.8	38.	2.7	43.	
	1.3	70.	1.9	42.	2.0	41.	2.5	42.	2.4	46.	1.3	76.	1.8	42.	1.3	51.	2.8	42.	2.6	45.	
	B60		C60		B60		LB30		LC22		D50		D40		D35		D30		D25		
11	1.2	56.	1.1	106.	1.4	61.	2.4	36.	2.9	37.	1.3	35.	1.6	95.	1.4	46.	2.1	45.	2.8	38.	800/0
12	1.3	59.	1.1	101.	1.3	66.	2.5	38.	2.5	38.	1.4	48.	1.6	40.	1.3	59.	2.5	39.	3.0	47.	
13	1.1	88.	1.1	68.	1.4	90.	2.0	40.	2.9	37.	1.3	53.	1.6	42.	1.3	48.	2.6	46.	3.3	41.	
	1.2	71.	1.1	91.	1.4	72.	2.3	38.	2.8	37.	1.3	45.	1.6	59.	1.3	51.	2.4	43.	3.0	42.	
14	1.2	46.	1.3	65.	1.4	60.	1.9	44.	2.3	40.	1.4	46.	1.8	38.	1.3	44.	2.2	45.	2.9	48.	267/0
15	1.2	59.	1.2	65.	1.4	60.	1.8	37.	2.4	42.	1.3	47.	1.6	48.	1.3	57.	2.4	40.	2.4	43.	
16	1.2	68.	1.2	64.	1.4	80.	2.0	44.	2.6	45.	1.4	44.	1.8	50.	1.3	58.	2.4	43.	2.9	38.	
	1.2	58.	1.2	65.	1.4	67.	1.9	42.	2.4	42.	1.4	46.	1.7	45.	1.3	53.	2.3	43.	2.7	43.	
17	1.3	57.	1.2	63.	1.5	63.	2.4	61.	2.8	58.	1.9	40.	2.0	55.	1.4	63.	2.5	55.	2.8	54.	45/0
18	1.2	111.	1.1	59.	1.5	30.	2.2	34.	2.9	38.	1.8	31.	2.1	37.	1.4	51.	3.0	44.	2.8	48.	
19	1.2	56.	1.2	65.	1.5	35.	2.6	38.	2.9	44.	1.8	30.	2.1	39.	1.4	57.	2.8	44.	3.0	42.	
	1.2	75.	1.2	62.	1.5	43.	2.4	44.	2.9	47.	1.8	34.	2.1	44.	1.4	57.	2.8	48.	2.9	48.	

Table 2-6. M198 - 18 May

SECTION 3
DESCRIPTION OF PROCESSING AND CALIBRATION

3-1 DATA COLLECTION

The data of the 15-19 May 79 Aberdeen test firings of the M198 and M109 was obtained by the US Army Aeromedical Laboratory (USAARL), Ft. Rucker, Alabama. A dubbing of the USAARL data was made by JAYCOR personnel using a Honeywell 101 tape recorder. After amplification by a Hewlett-Packard Model 467A Power Amplifier the analog signal was transmitted to a Digital Equipment Corporation Model LPA11-K analog-to-digital converter. The digitized signals were then processed by JAYCOR's VAX 11/780 computer. A description of the analysis software has been provided in previous reports.

3-2 DESCRIPTION OF DIGITIZATION

The data tape was played back at 60 inches per second (ips), or half the recorded rate and was digitized at 40,000 samples per second, giving an effective sampling rate of 80,000 samples per second. No analog antialiasing filter was used.

Except for the gauges that measured the interior of the M109, record lengths of 225 ms or 18,000 samples were taken. Because of the ringing in the interior, record lengths of 312.5 ms or 25,000 samples were used on these gauges.

3-3 CALIBRATION

Calibration signals were transmitted to each of the gauges on each test day prior to and after the firings. The calibration signal is a 90 hertz sinusoidal waveform with a peak level of 153 dB and is recorded on the same tape as the shot data. The calibration signal is digitized and processed to give a calibration factor which is used to convert the electronic voltage signal into pressure units. Table 3-1 gives the conversion factors for each gauge and the percentage change from pre-shot to post-shot calibrations.

Table 3-1.
CALIBRATION

Units are in psi per volt times 10^3.

The second and third columns are the pre-shot and post-shot calibration factors respectively. The fourth column is the percentage change from pre-shot to post-shot.

May 15				May 16			
Gauge	Pre-Shot	Post-Shot	±%	Gauge	Pre-Shot	Post-Shot	±%
1	9.64	9.12	-5.4%	1	9.56	8.68	-9.3%
2	8.40	8.56	1.8%	2	8.44	8.60	1.8%
3	13.78	13.36	-3.1%	3	13.36	11.79	-11.7
4	9.64	10.00	3.7%	4	10.00	10.06	0.6
5	7.29	7.41	1.6%	5	7.32	6.92	-5.5
6	7.90	8.06	2.0%	6	7.89	7.77	-1.6%
7	8.32	8.46	1.7%	7	9.12	9.40	3.0%
8	8.15	8.93	9.6%	8	8.30	8.18	-1.4%
9	7.27	7.40	-1.8%	9	7.38	7.40	0.4%
10	7.37	7.37	0.0%	10	7.30	7.64	4.7%

May 17				May 18			
Gauge	Pre-Shot	Post-Shot	±%	Gauge	Pre-Shot	Post-Shot	±%
1	9.73	9.46	-2.2%	1	9.74	9.67	-0.7%
2	8.33	8.37	-1.0%	2	8.49	8.41	-0.9%
3	11.59	11.61	0.2%	3	11.63	11.80	1.4%
4	10.25	10.10	-1.4%	4	10.18	10.15	-0.3%
5	6.83	7.07	3.5%	5	6.80	6.79	-0.2%
6	7.75	7.84	1.0%	6	7.73	7.80	1.0%
7	10.01	9.93	0.7%	7	10.49	10.29	-1.9%
8	8.23	8.23	0.0%	8	8.37	8.52	1.7%
9	7.42	7.32	-1.4%	9	7.27	7.36	1.1%
10	7.36	7.30	0.8%	10	7.32	7.35	0.4%

In only five of the 40 pre-shot and post-shot calibration combinations were there a difference of more than 5%. These are shown on Table 3-2.

Table 3-2

Over 5% Calibration Corrections

15 May		16 May	
Gauge 1	5.4%	Gauge 1	9.3%
Gauge 8	9.6%	Gauge 3	11.7%
		Gauge 5	5.5%

SECTION 4
COMPARISON WITH NOV 78 M198 TEST

4-1 DISCUSSION

This section contains a comparison of the peak pressures and B-durations obtained from the 30 November 78 and 15 May 1979 test firings of the M198 with the M203 charge at Aberdeen Proving Grounds. The three shot averages of these quantities are given in Table 4-1 along with their standard deviations.

The average peak pressures tended to be closer between tests than the B-durations, especially on the B and C radials (See Table 4-2) where only C40 at QE 800 had a difference in the average peak of more than 2 dB. Also included are the 18 May 79 results of the M198 fitted with the chrome tube.

It is difficult to make a judgment of the significance of the difference between the results of the test firings. Some of the factors to which a difference may be attributed are:

- o Variation in powder charges.
- o Difference in individual artillery weapon.
- o Atmospheric conditions.
- o Errors in transducer placement.

As an example of the sensitivity of peak pressure to transducer placement, consider the following results from the 30 Nov 78 firing where the pressure was recorded at varying heights above ground level at the same location: for C22 at 800 mils QE and heights 3', 4', 5' and 6' the three shot average peak pressures recorded were 2.21, 2.11, 2.56 and 2.25 psi, respectively. Other results of this type were noted in the JAYCOR report-DAMD 17-78-C-8062, dated August 13, 1979.

Table 4-1. COMPARISON OF M198 TEST RESULTS
FROM 30 NOV 78 AND 15, 18 MAY 79, ABERDEEN PG

QE 267 AZ-0

Gauge Location Radial °/Meters	30 Nov 78 Peak psi	dB	B-Duration ms	15 May 79 Peak psi	dB	B-Duration ms
0°/40M	0.73±.05	168.0	127±10	0.80±.00	168.8	87±15
0/30	1.14±.03	171.9	48±17	1.31±.02	173.1	60±8
0/20	2.73±.49	179.5	20±1	2.37±.06	178.2	49±5
0/10	2.98±.15	180.2	32±0	3.80±.18	182.3	45±3
30/40	0.72±.01	167.9	43±16	0.86±.04	169.4	----
30/30	1.14±.10	171.9	98±40	1.72±.05	175.5	32±9
30/20	1.94±.24	176.5	49±19	2.58±.10	179.0	30±1
30/10	2.90±.10	180.0	33±3	3.73±.29	182.2	43±11
60/40	0.80±.02	168.8	78±43	0.89±.03	169.7	48±9
60/30	1.24±04	172.6	31±1	1.45±04	174.0	39±6
60/20	2.16±03	177.4	30±5	2.48±16	178.6	32±1
60/10	3.40±.16	181.4	32±1	4.16±06	183.1	37±6
90/40	1.03±.14	171.0	31±6	0.90±.05	169.8	40±6
90/30	1.66±.18	175.2	23±0	1.56±.09	174.6	35±1
90/20	2.07±.10	177.1	29±0	2.32±.05	178.1	34±0
90/10	3.47±.09	181.6	----	--------	-----	----
120/40	1.09±.09	171.5	35±4	0.85±.04	169.3	50±2
120/30	1.53±.10	174.4	65±14	1.43±.06	173.9	42±2
120/20	1.95±.06	176.6	40±6	1.86±.03	176.1	50±12
120/10	--------	-----	-----	3.46±.13	181.5	40±6
150/40	0.77±.05	168.5	40±6	0.49±.02	164.6	112±29
150/30	0.96±.12	170.4	36±10	0.89±.03	169.7	67±5
150/20	1.13±.02	171.8	44±8	1.13±.03	171.8	77±31
150/10	1.88±.06	176.2	43±6	2.09±.07	177.2	53±7

The peaks and B-durations reported are the three shot averages with their standard deviations.

Gauges were 5' from ground level.

Table 4-2. COMPARISON OF M198 TEST RESULTS
FROM 30 NOV 78 AND 15, 18 MAY 79, ABERDEEN PG

Gauge Location	30 Dec 78 Peak psi	30 Dec 78 Peak dB	30 Dec 78 B-Duration ms	15 May 79 Peak psi	15 May 79 Peak dB	15 May 79 B-Duration ms	18 May 79 Chrome Tube Peak psi	18 May 79 Chrome Tube Peak dB	18 May 79 Chrome Tube B-Duration ms
QE 267 AZO									
C22	---	---	---	2.52±.17	178.8	55±9	2.47±.25	178.6	51±2
C30	1.91±.16	176.4	37±5	1.90±.15	176.3	52±8	1.70±.12	175.4	57±4
C35	---	---	---	1.60±.06	174.8	97±45	---	---	---
C40	1.37±.05	173.5	53±13	1.46±.03	174.0	94±43	1.33±.07	173.2	67±20
B25	---	---	---	2.12±.19	174.7	106±45	2.11±.07	177.2	55±7
B30	1.89±.22	176.3	51±19	1.57±.05	174.7	106±45	1.92±.14	176.4	53±2
QE 800 AZO									
C22	2.56±.10	178.9	46±2	2.25±.09	177.8	61±31	2.41±.20	178.4	50±10
C30	1.96±.09	176.6	44±1	1.75±.10	175.6	62±10	1.78±.09	175.8	50±10
C35	1.96±.63	176.6	46±5	1.64±.10	175.0	129±30	---	---	---
C40	1.37±.09	173.5	55±9	1.36±.08	173.4	140±26	1.28±.06	172.9	111±70
B25	---	---	---	2.27±.09	177.9	52±11	2.13±.06	177.3	48±11
B30	1.90±.03	176.3	43±0.8	1.96±.03	176.6	62±10	2.03±.06	176.9	51±16

The peaks and B-durations reported are the three shot averages with their sample standard deviations except for location C22 on 15 May 79 where 12 shots were available.

Gauges were located 5 ft. from ground level.

SECTION 5
PRESSURE RECORDINGS FROM THE CREW COMPARTMENT OF THE M109

5-1 INTRODUCTION

On the second day of testing, four gauges (Nos. 5, 6, 7 and 8) were positioned in the crew compartment of the M109. They were placed approximately in the four corners of the rectangular crew compartment. Thirty-six rounds were fired with the gauges inside. A listing of the rounds follows:

Round	Quadrant Elevation-mil	Hatch Configuration
2-4	1225	All Closed
5-7	510	All Closed
8-10	40	All Closed
11-13	1225	Rear Hatch Open, Others Closed
14-16	510	Rear Hatch Open, Others Closed
17-19	40	Rear Hatch Open, Others Closed
20-22	1225	Side and Rear Open, Others Closed
23-25	510	Side and Rear Open, Others Closed
26-28	40	Side and Rear Open, Others Closed
29-31	1225	All Open, But Driver's
32-34	510	All Open, But Driver's
35-37	40	All Open, But Driver's

5-2 EXAMPLES FROM THE FRONT RIGHT (FR) GAUGE

For the purpose of illustation, the Gauge 6 pressure time histories and power spectra of five rounds of firing are presented in Figures 5-1 through 5-15. Gauge 6 was located in the front right (FR) of the crew compartment for rounds 2-37 and was then moved to position 150/30 outside the gun for the rest of the day's testing. The shots illustrated are the following.

Shot		QE/AZ
2	All Hatches Closed	1225/0
11	Only Rear Hatch Open	1225/0
20	Rear and Side Hatches Open	1225/0
30	All Open But Drivers	1225/0
38	Gauge Outside at 150/30	1225/0

Examples of other interior pressure records and power spectra are given in section 7 of this report.

Shot 38 is included to contrast the inside records with a typical record in the external field. Figures 5-1 through 5-5 are the pressure time histories of these shots. Two hundred milliseconds of the records are given in each case. Note, however, that the pressure scales are different. Figures 5-6 through 5-13 contain the lowest 2500 hertz of the power spectra of these shots.

(If x_i where $i = 0, \ldots, N-1$ is the digitized pressure record sampled at time interval Δt then the Fast Fourier Transform (FFT) is $X_k = \sum_{i=0}^{N-1} x_i \exp(j2\pi ki/N)$ and the power spectrum is $P_k = 2\,\Delta t\,|X_k|^2/N$ for $k=0, \ldots, N-1$).

The last five figures are the first 250 hertz of the power spectra.

5-3 DISCUSSION OF THE RECORDS

Because the gauges are mechanically coupled to the gun through the supports there is considerable noise in the pressure records. In some cases (though not in the graphs presented here) a vibration is present in the record before the onset of the acoustic pulse. At low overpressures it is impossible to estimate what part of the record is due to acoustic pressure and what part is due to mechanical vibration. In addition, complications in the record are due to the many reflections of the sound waves inside the crew compartment.

Figures 5-1 and 5-6 illustrate a particular record obtained with all the hatches closed. Since there is no direct opening to the outside there is no sharp shock front present. In no case was the peak overpressure over 1.0 psi, the maximum of 1.0 psi occurred in the rear left (RL) gauge on shot 10. Thus, although the B-durations were sometimes over 300 ms, none of the records exceeded the Z-line.

Of particular note is the ringing in the curve. Two cycles of the ringing labeled C1 and C2 are marked in Figure 5-1. The ringing appears in the power spectrum, Figure 5-6, at about 325-350 hertz where the peak is labelled A.

This ringing is also present in the other records taken in the interior (Figure 5-2 through 5-4 and at point A in Figure 5-6 through 5-9). This peak is conspicuously absent in the power spectrum of the exterior shot 38 (Figure 5-10). Thus the ringing is probably due to mechanical vibration in the howitzer.

When the rear hatch was opened (Figure 5-2) and the interior air had easier access to the outside atmosphere a larger peak overpressure occurred. Two of the records in this hatch configuration exceeded the Z-line (Shots 11 and 16 for gauge 6 in the front right of the compartment). Appearing in the records with the rear hatch open is a large oscillation of 10-15 hertz (see interval 3 of Figure 5-2). The corresponding peak in the power spectrum is labelled B in Figures 5-7 and 5-12.

When the side hatches, in addition to the rear hatch, are open the shock front becomes more defined (Figure 5-3) and the peak levels increase to about 1.5 psi. The majority of shots at all interior locations exceed the Z-line for this configuration.

Finally, with all hatches open but the driver's hatch, the peak overpressures range to over 2 psi (see Figure 5-14). Though the large oscillation appearing in Shots 11-19 is no longer dominant, the mechanical ringing near 350 hertz is very apparent. Consequently, the B-durations are in the 200 ms range.

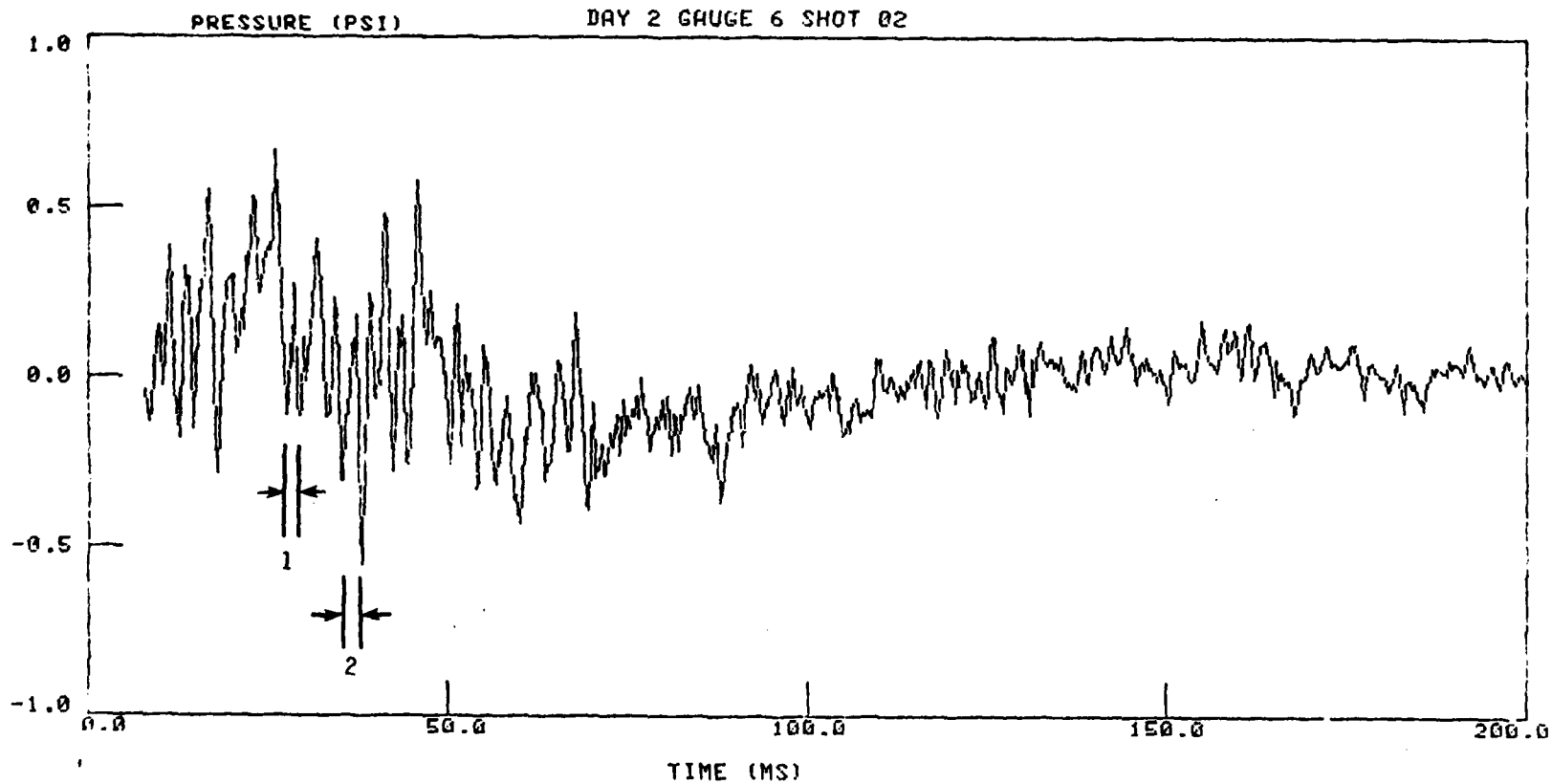


Figure 5-1. Front Right of Interior, All Hatches Closed

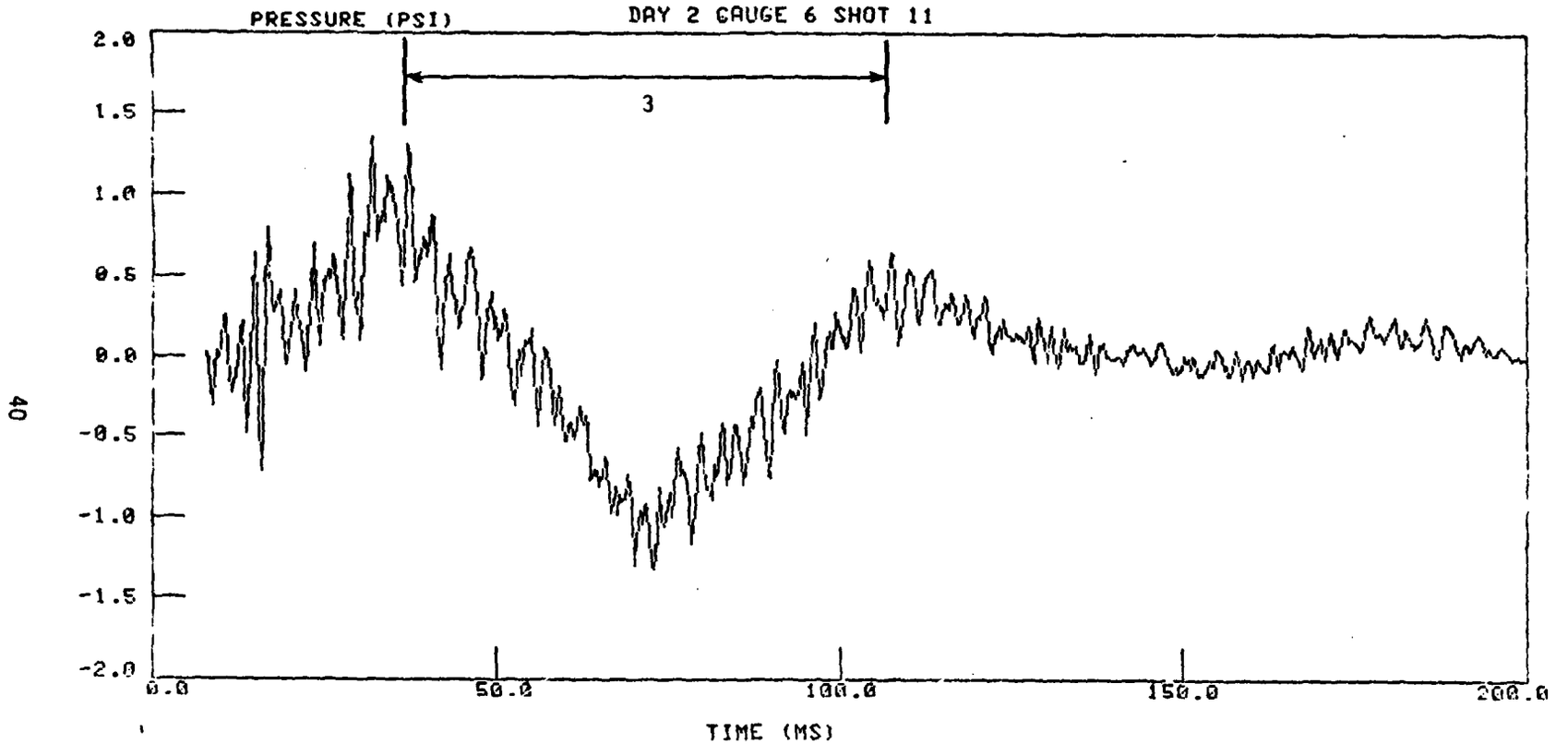


Figure 5-2. Front Right of Interior, Rear Hatches Open

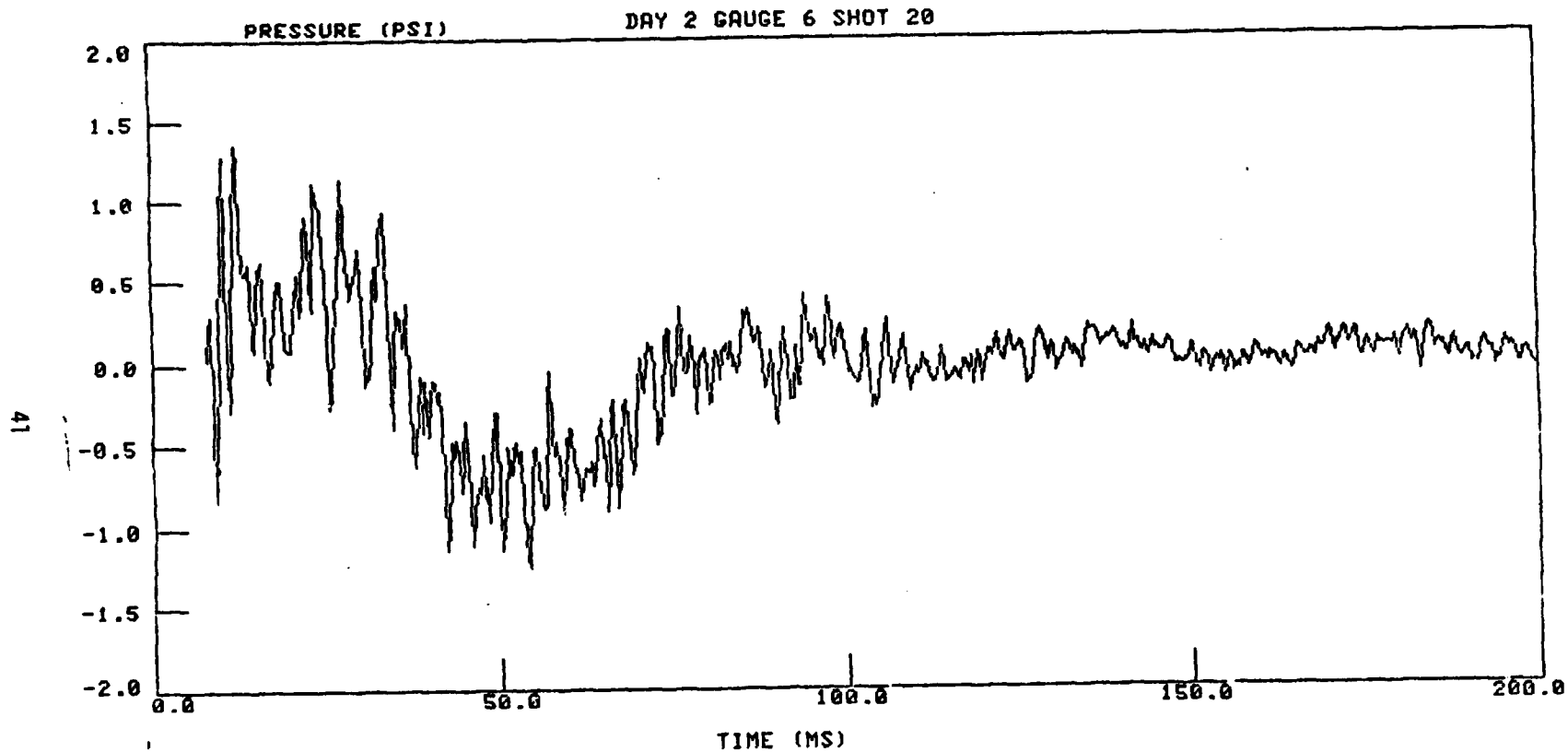


Figure 5-3. Front Right of Interior, Side and Rear Hatches Open

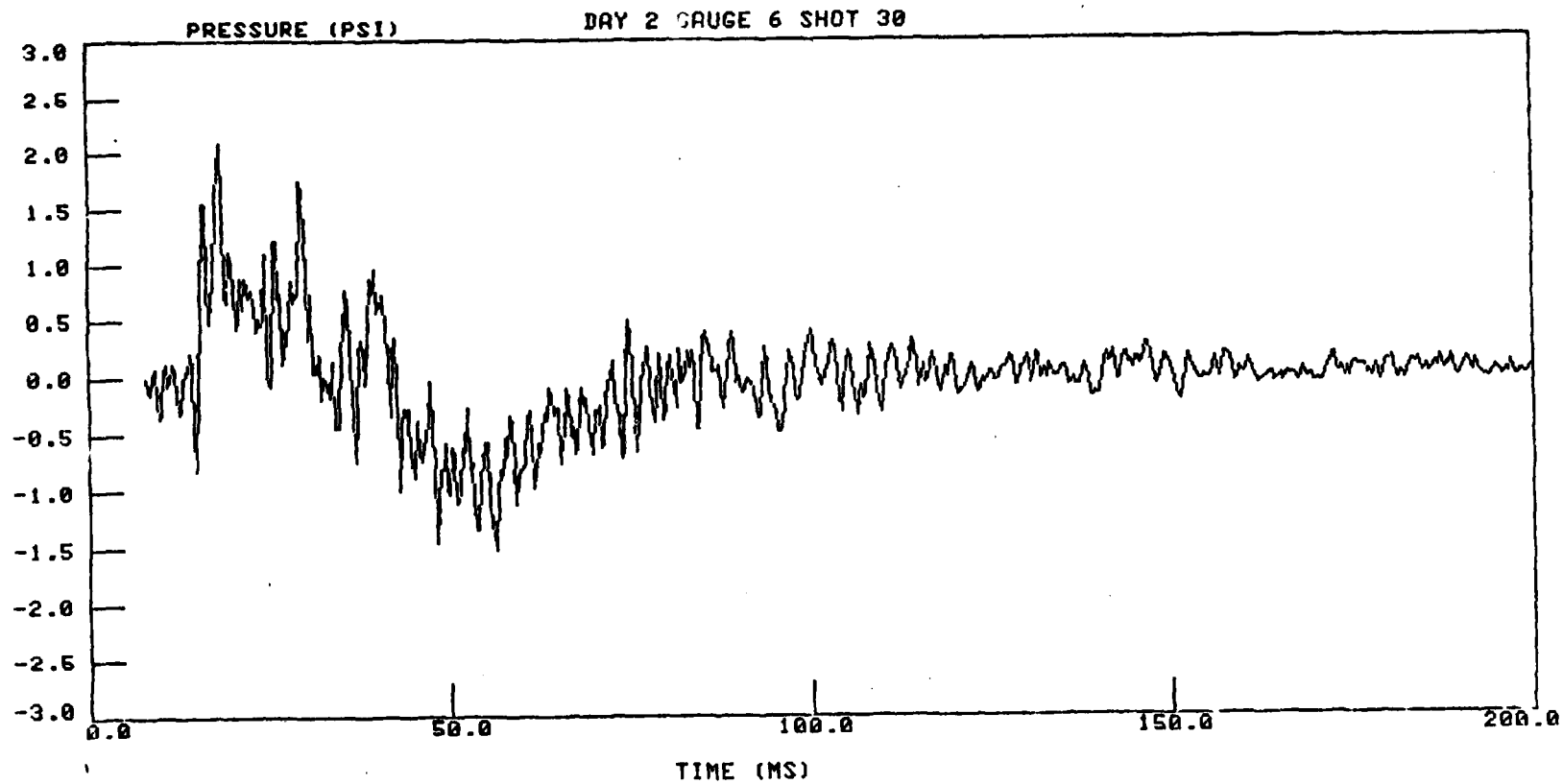


Figure 5-4. Front Right of Interior, All Hatches Open Except Driver's Hatch

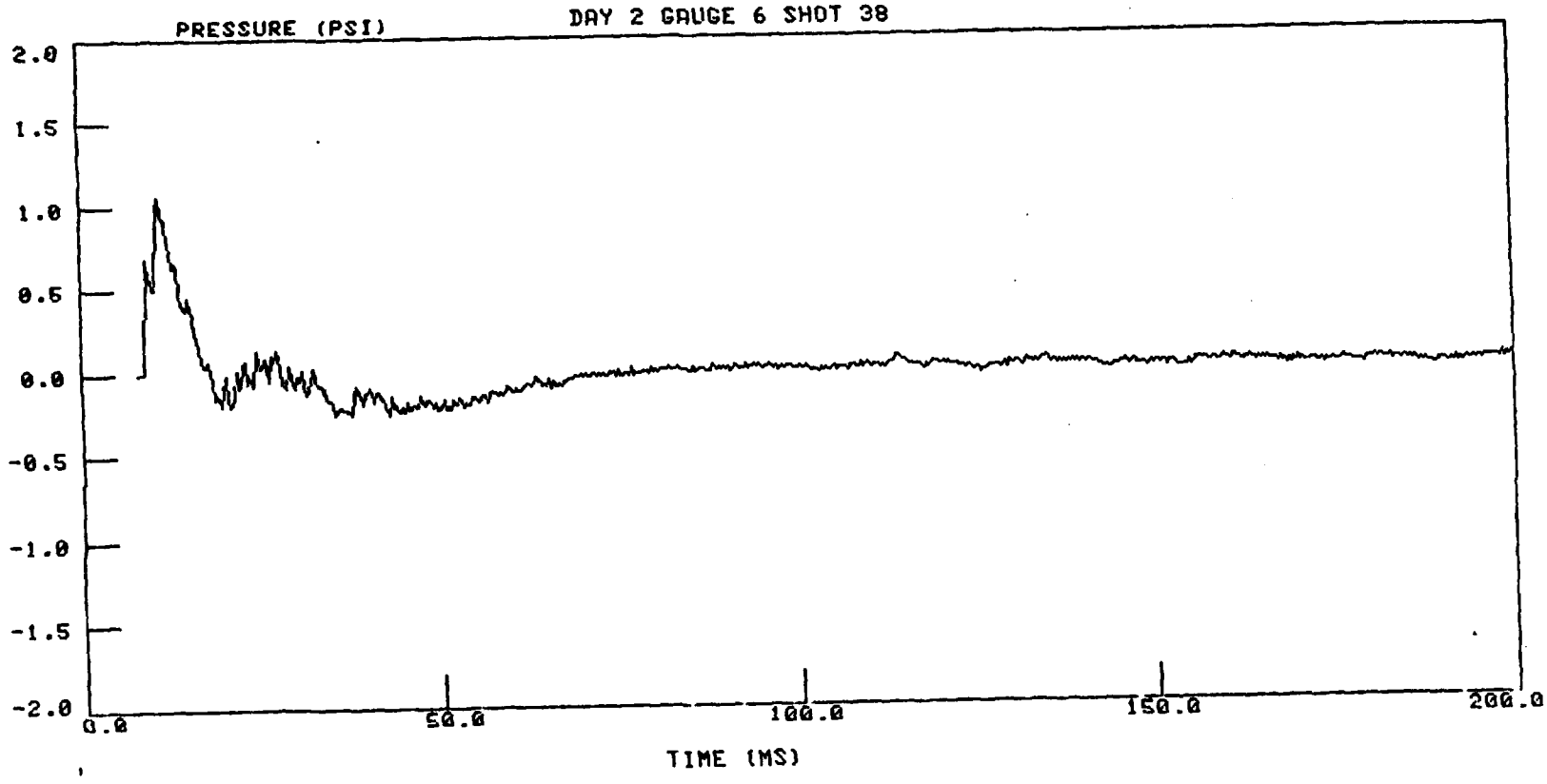


Figure 5-5. Location 150/30

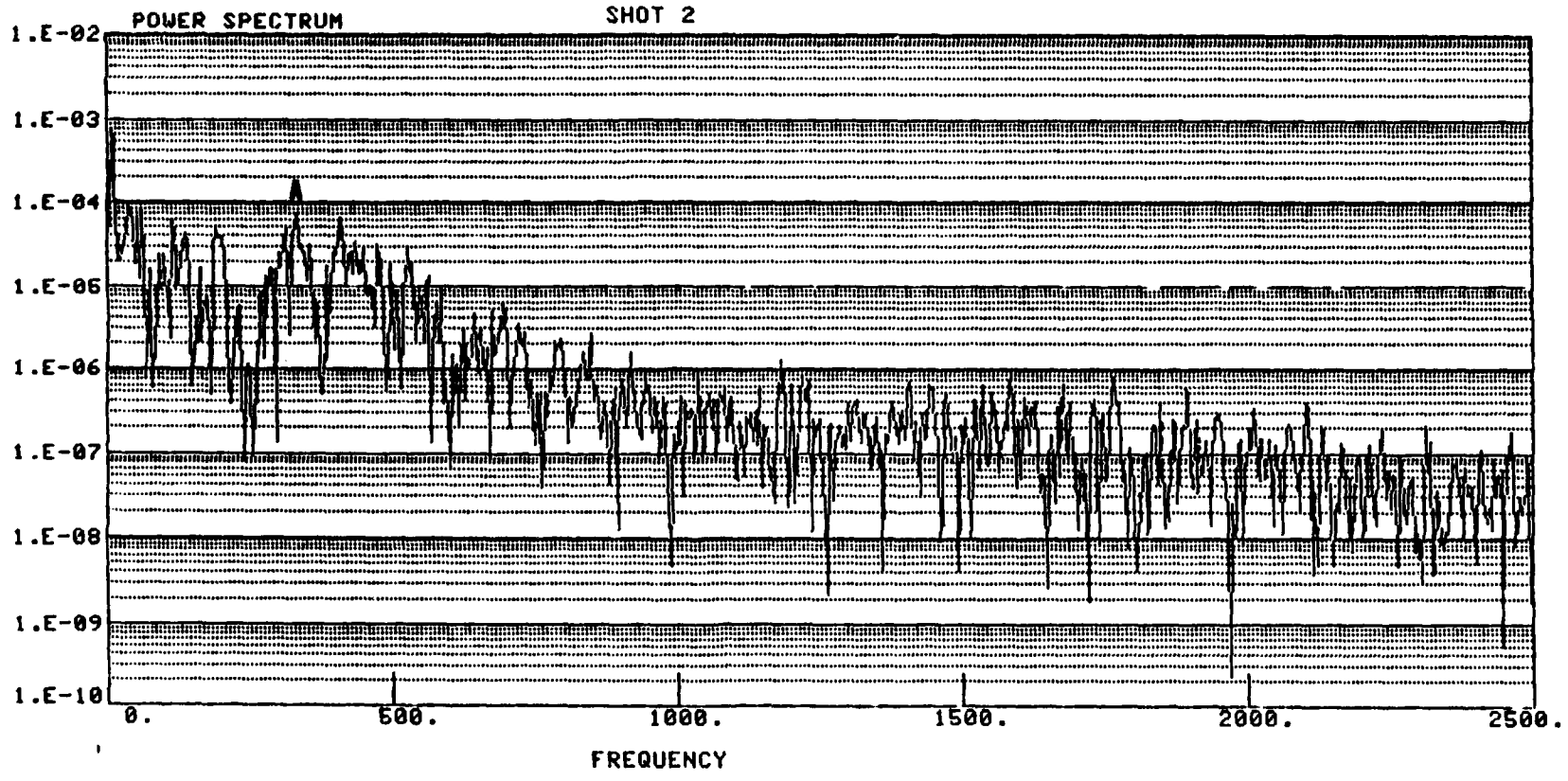


Figure 5-6. Front Right of Interior, All Hatches Closed

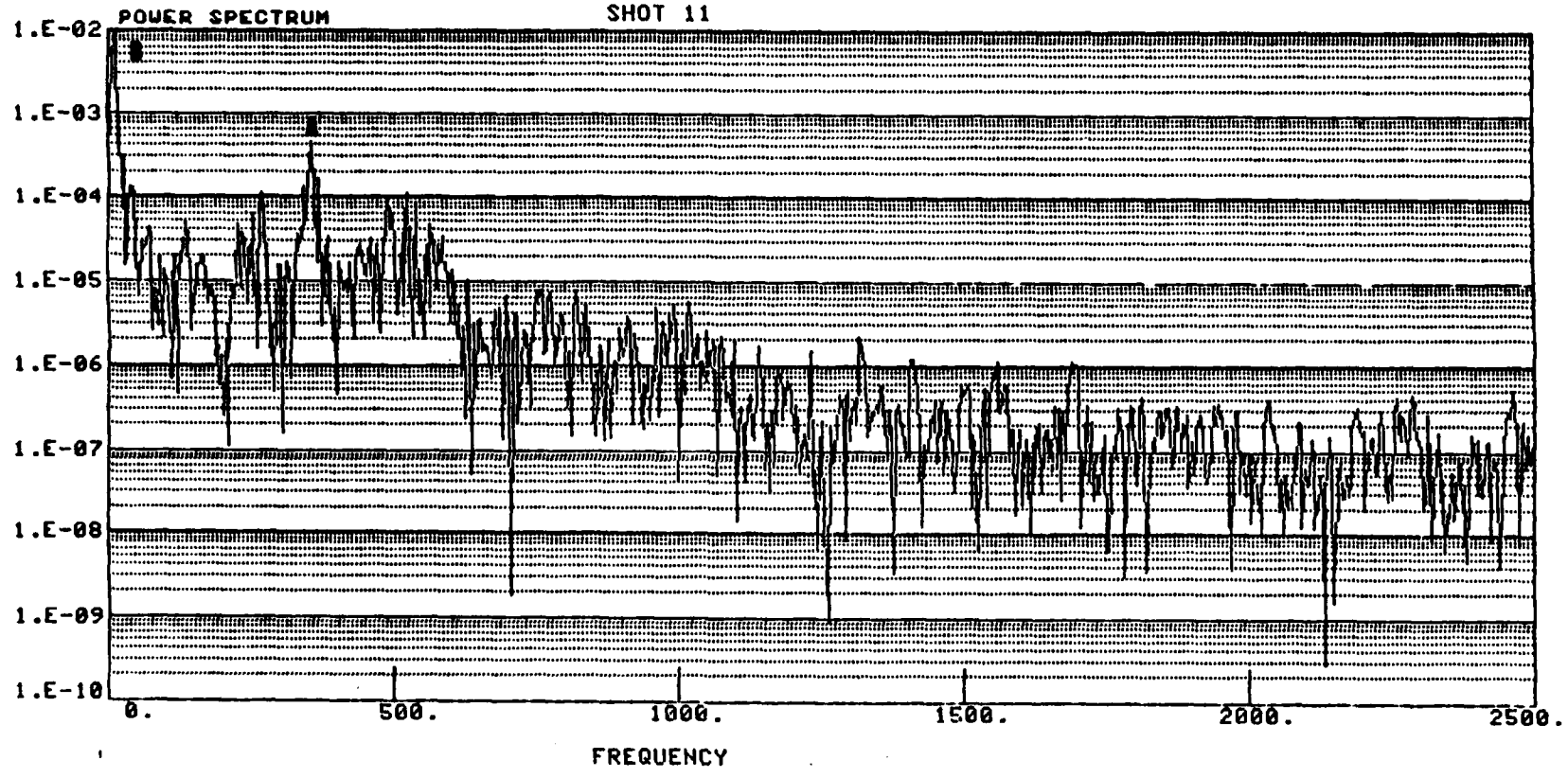


Figure 5-7. Front Right of Interior, Rear Hatches Open

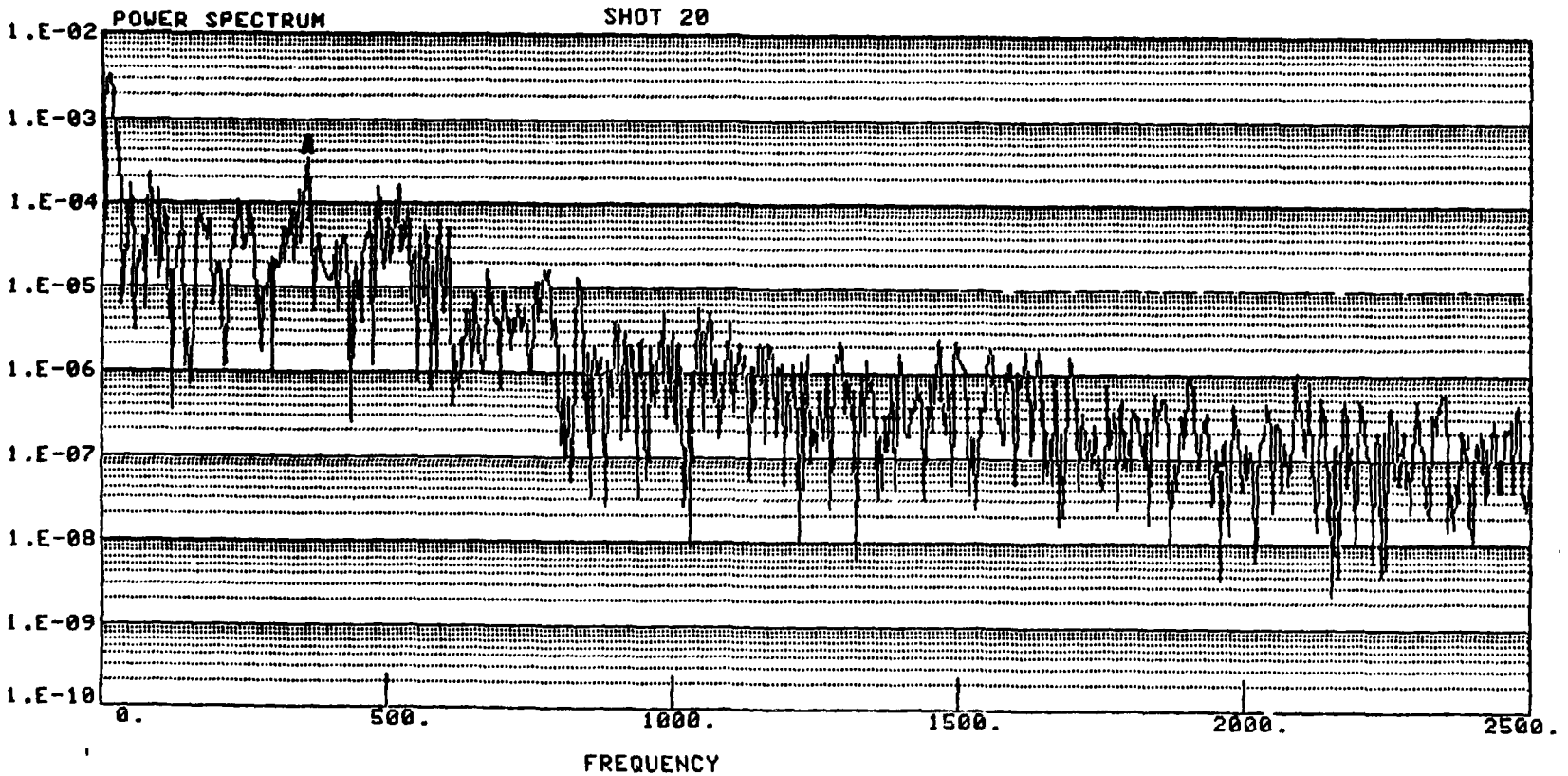


Figure 5-8. Front Right of Interior, Side and Rear Hatches Open

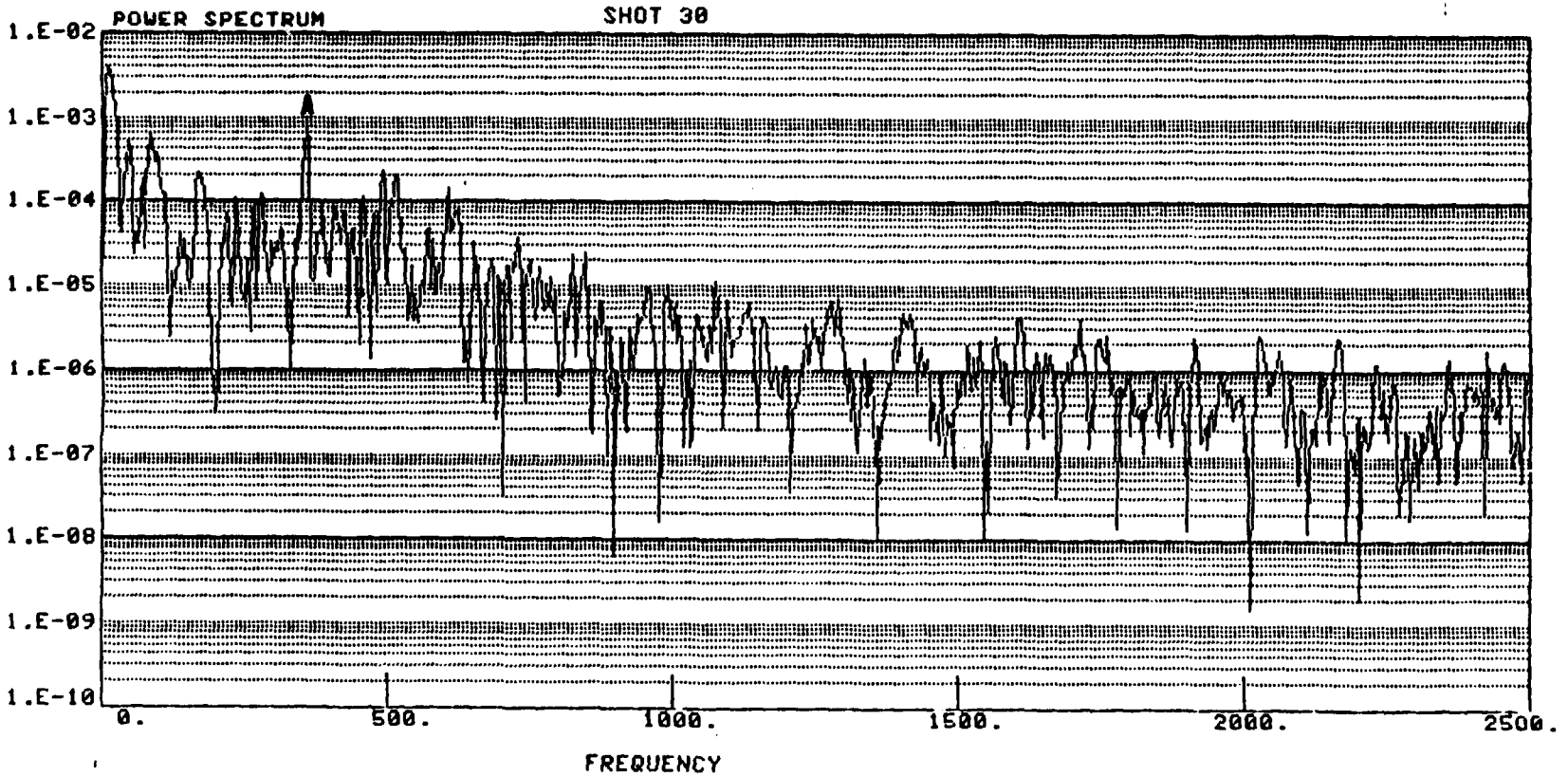


Figure 5-9. Front Right of Interior, All Hatches But Driver's Open

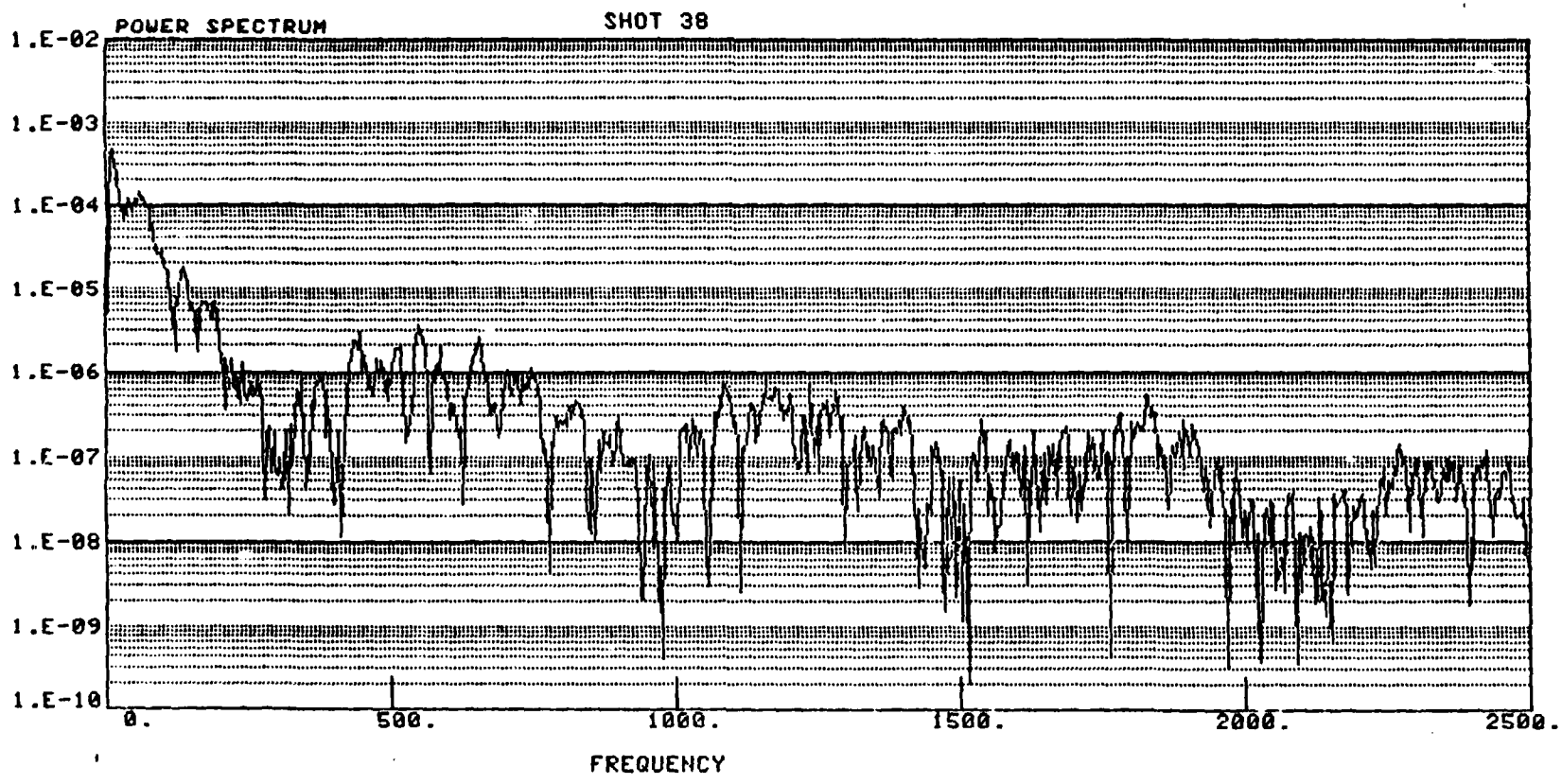


Figure 5-10. Location 150/30

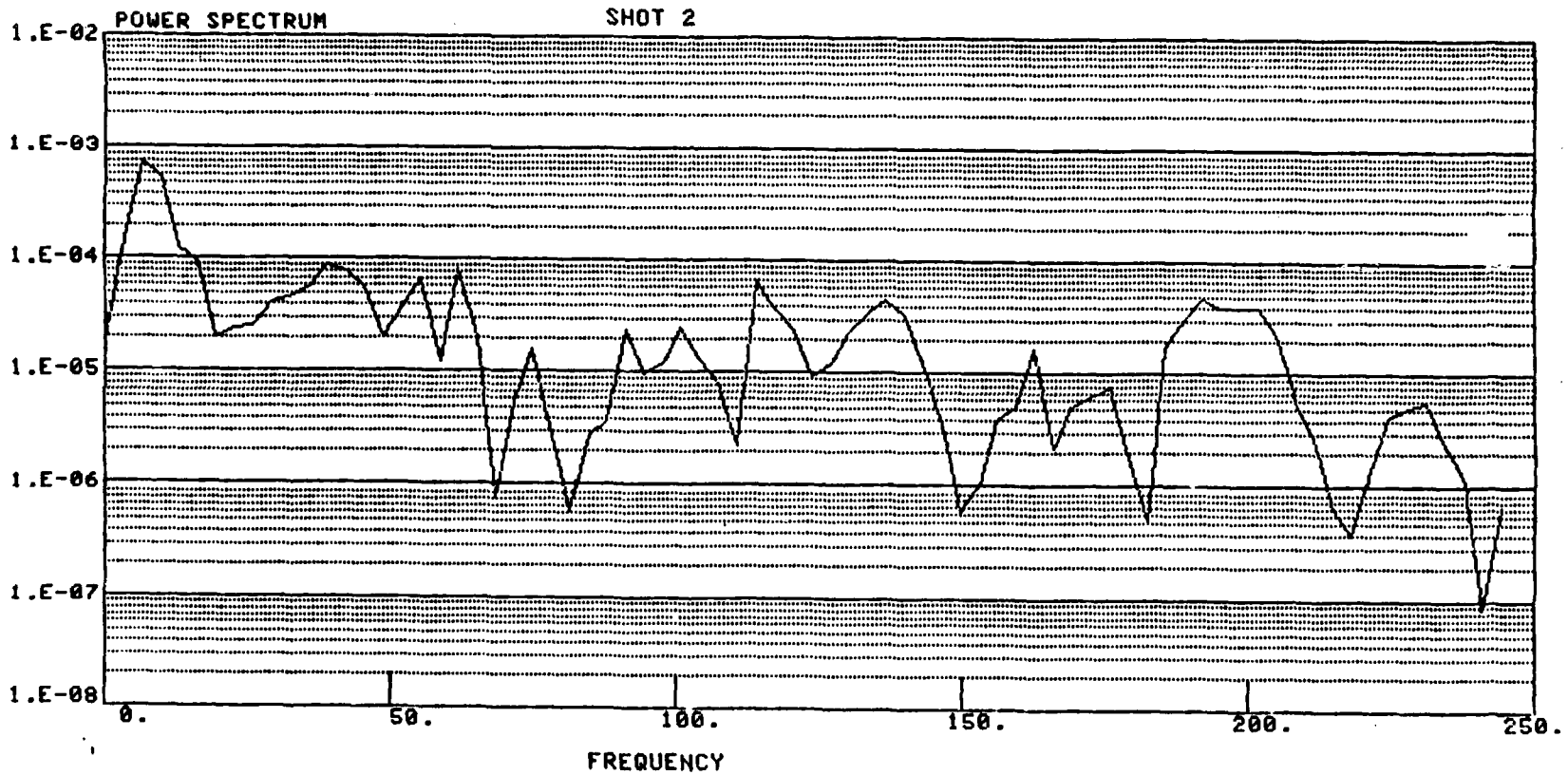


Figure 5-11. Front Right of Interior, All Hatches Closed

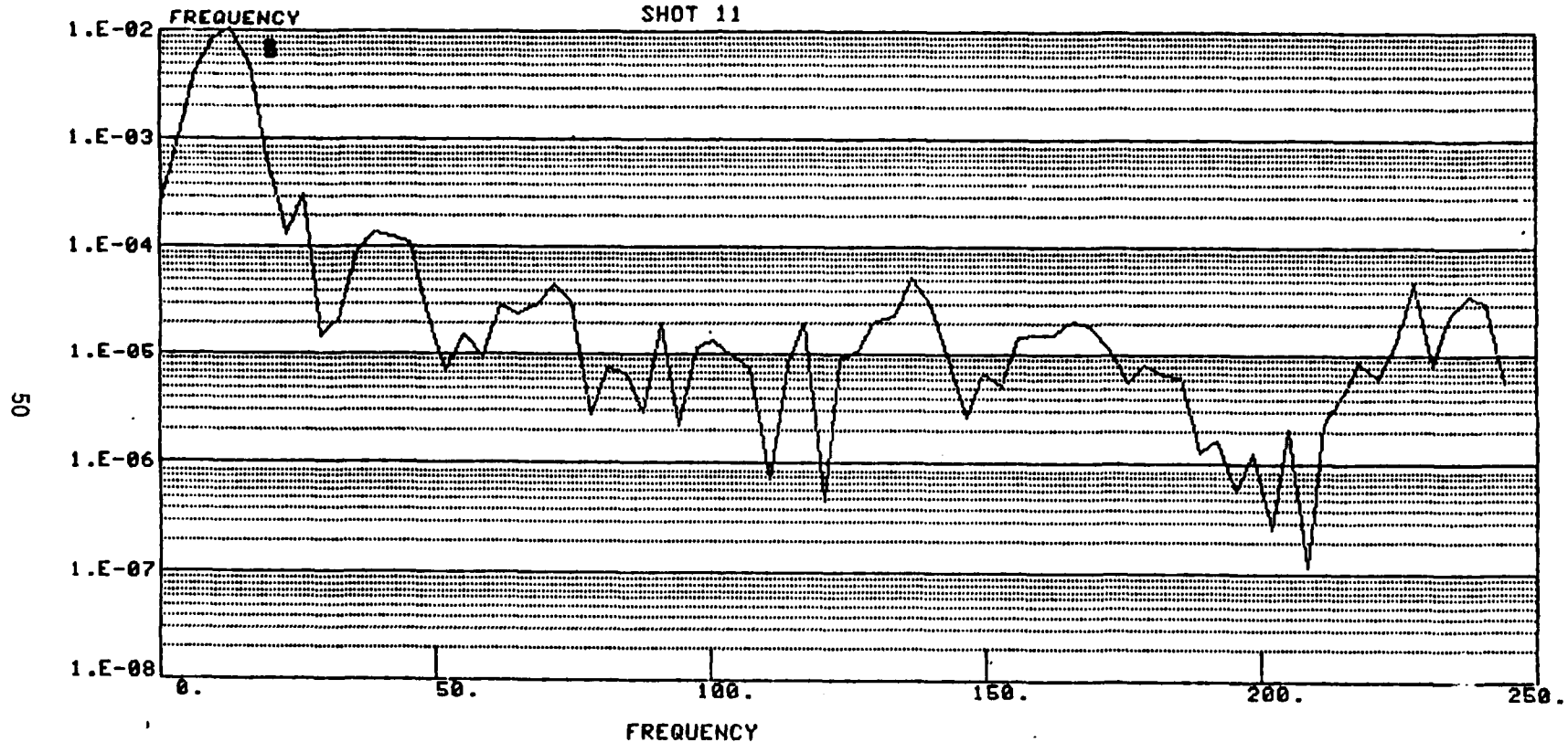


Figure 5-12. Front Right of Interior, Rear Hatches Open

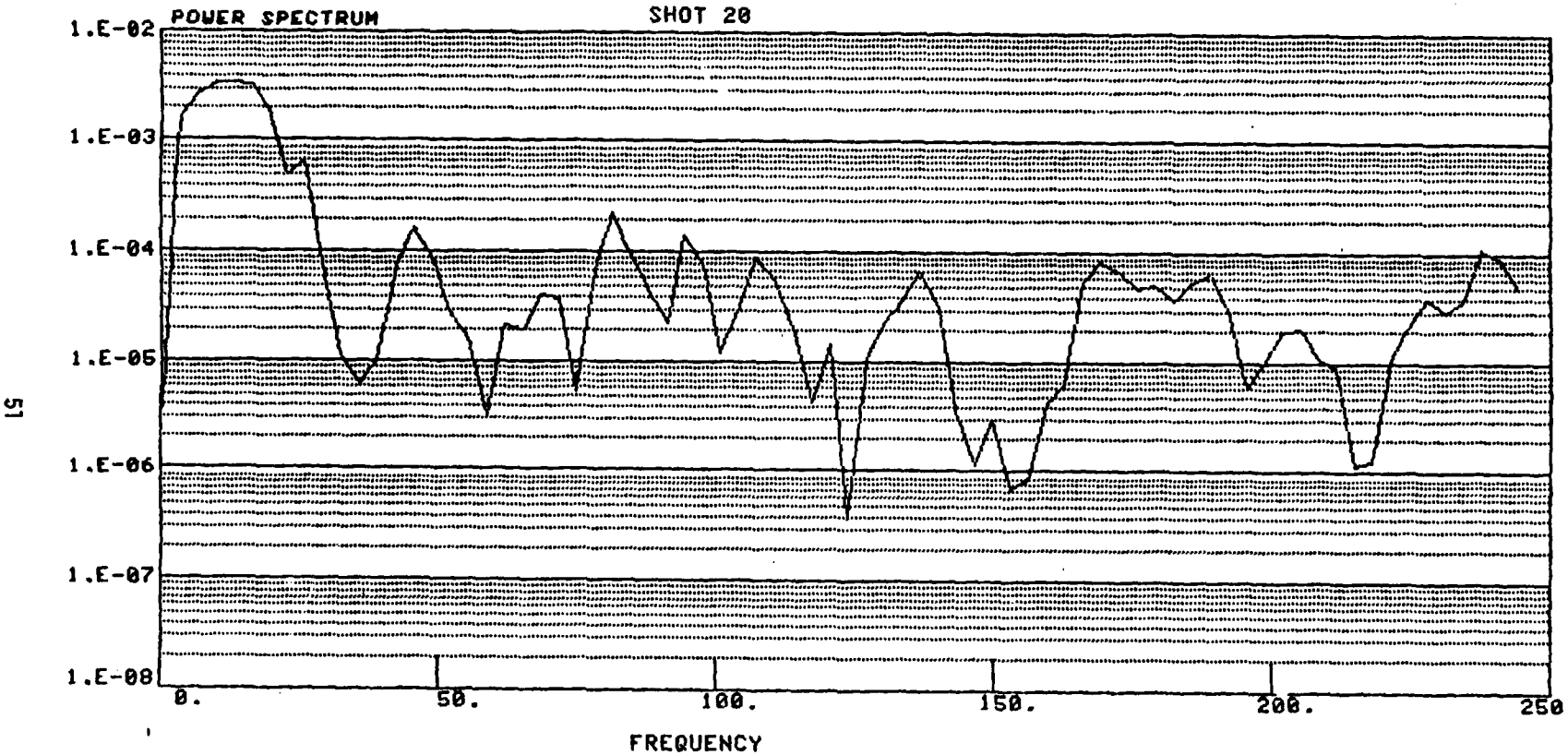


Figure 5-13. Front Right of Interior, Rear and Side Hatches Open

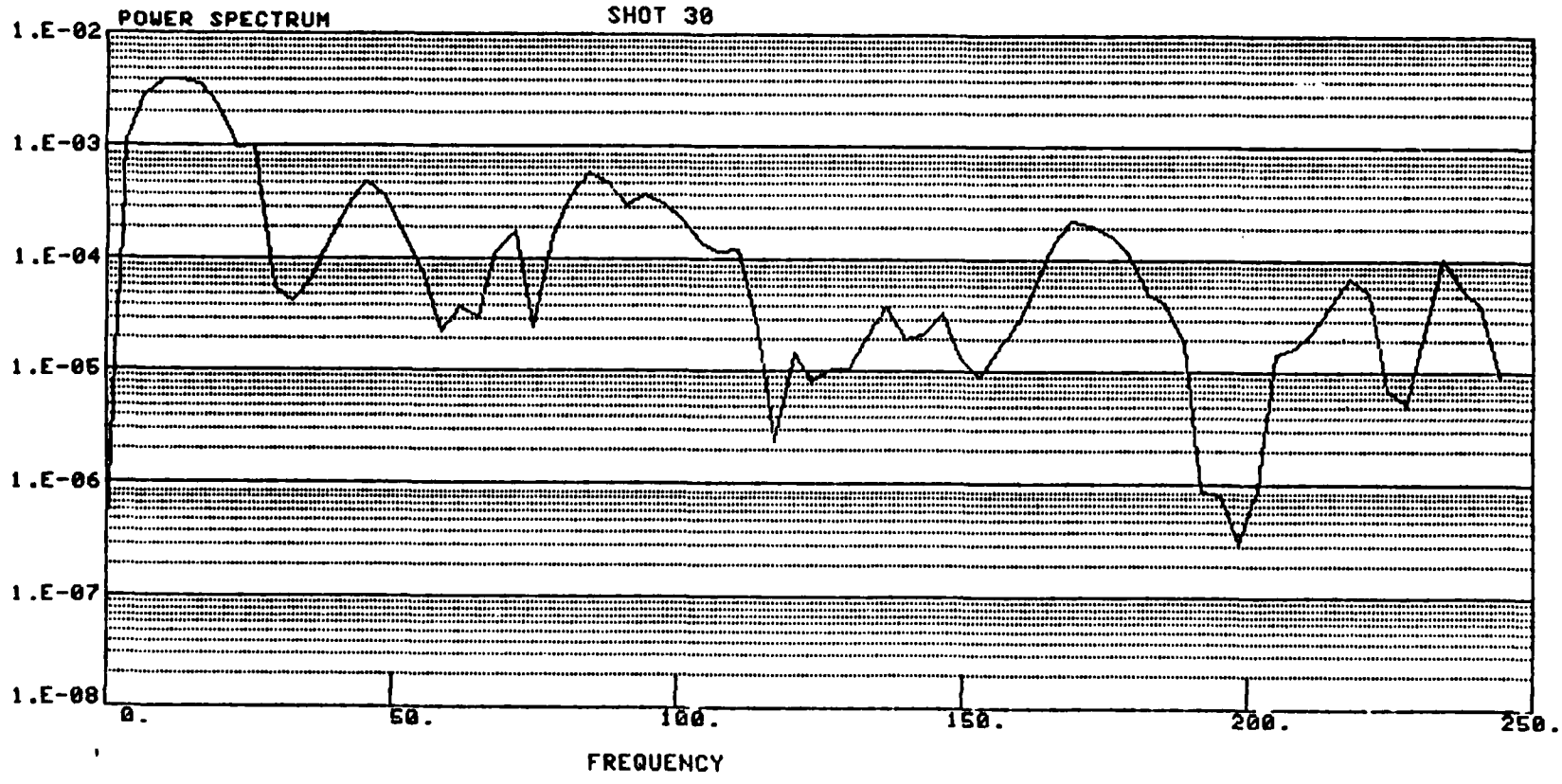


Figure 5-14. Front Right of Interior, All Hatches But Driver's Open

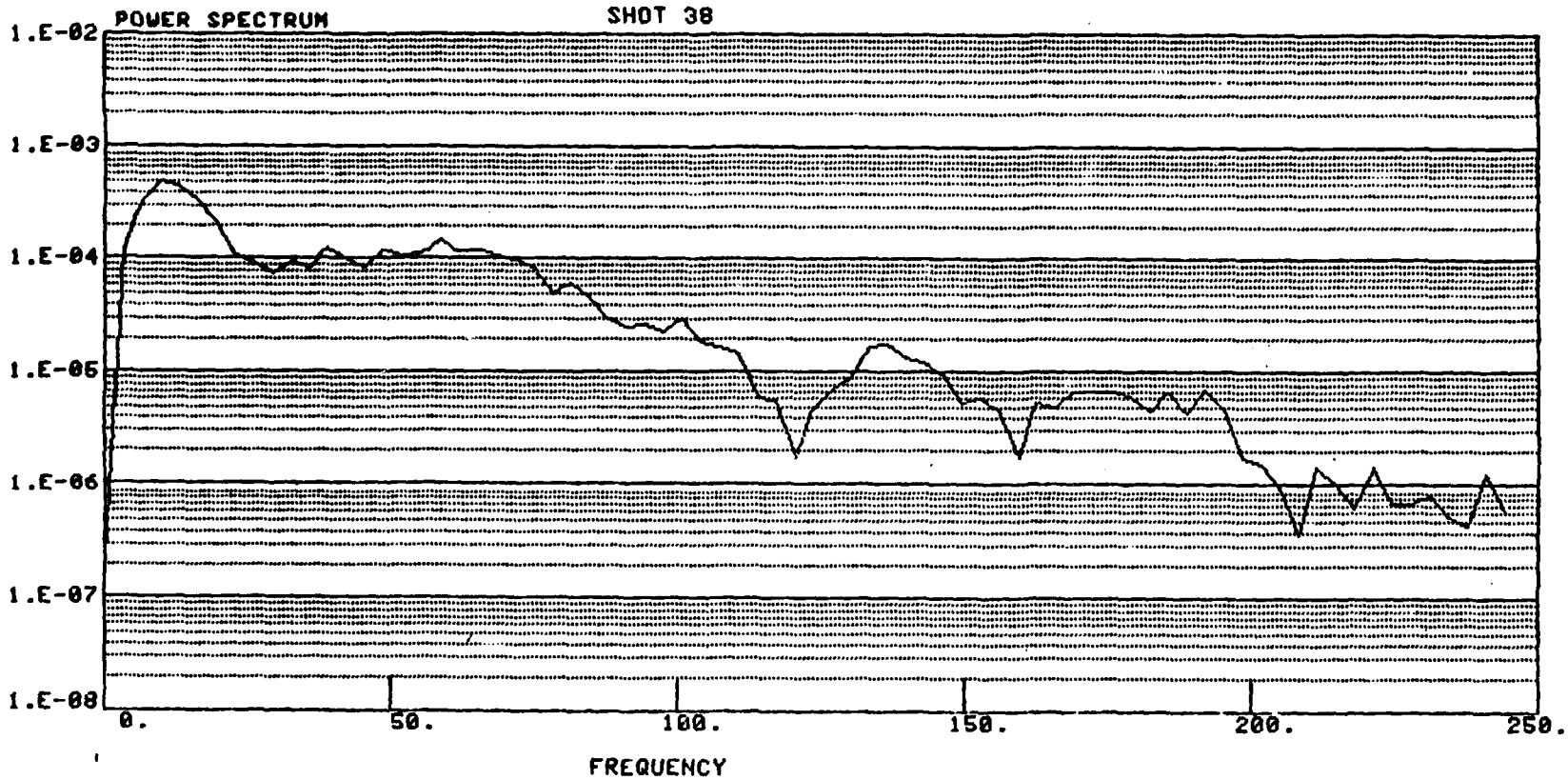


Figure 5-15. Location 150/30

5-4 SUMMARY

In summary, because of the mechanical coupling of the transducers to the chassis and because of multiple reflections, the pressure records taken in the crew compartment of the M109 are very complicated. Though the peak overpressure levels are attenuated by the wall of the cabin the B-durations are extremely long when compared to records in the exterior field. With all hatches closed none of the records exceeded the Z-line. However, as soon as the rear hatches were open the Z-line was exceeded.

SECTION 6
DETAILED SHOT DATA

6-1 DESCRIPTION OF TABLE HEADLINES

The following tables contain detailed results from the individual shots during the May test-firings of the M198 and M109 at Aberdeen Proving Grounds.

The headings of the tables are defined as follows:

SHOT: the shot number for the day reported.

MAXIMUM PRESSURE: the maximum recorded overpressure in psi and also in dB.

MIN: the minimum pressure in psi.

TIME MIN: the time relative to pulse arrival at which the minimum pressure occurs (in milliseconds).

MAX, REFL MAX; the typical overpressure wave for the howitzer consists of an initial pulse coming directly from the muzzle to the gauge followed by a pulse which arrives at the gauge after having bounced off the ground (see examples in Section 7). The anaylsis software program attempts to separate the two pulses and find the maximum level encountered in each. These are called INIT MAX and REFL MAX. Note that for certain locations, e.g. the interior of the M109, the overpresure wave does not follow the form described above, and, consequently the separation into inital and reflected pulses cannot be made.

TIME REFL: the time relative to pulse arrival at which the relative maximum occurs in milliseconds.

EST MAX, AVE EST: as described in previous reports the analysis program attempts to correct the initial maximum for finite gauge rise time and for overshoot problems by regression analysis. The regression analysis fits nine lines through the front of the pulse. The largest prediction of these is called the EST MAX, while the average of the nine fits is called the AVE EST.

ADUR: A-duration in milliseconds.

BDUR: B-duration in milliseconds.

TOT IMP: the total impulse in psi-milliseconds

POSIMP: the positive impulse in milliseconds from pulse onset until the pressure enters the negative expansion phase. For pulses without the standard structure this parameter is meaningless.

NOTES:

1. For the gauge locations see Section 2 of this report.

2. A B-duration reported as zero indicates that the B-duration was at least as long as the digitized record length, which was 225 ms for all records except those of gauges 5,6,7, and 8 on 16 May where it was 312.5 ms.

M198 TEST 15 MAY 79 ABERDEEN PG

GAUGE 1

SHOT	MAXIMUM PRESSURE PSI	DR	MIN PSI	TIME MIN MS	INIT REFL MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	0.8	168.6	-0.3	14.05	0.8	0.7	1.00	0.8	0.8	7.8	41.	1.5	2.7
2	0.8	168.5	-0.3	14.39	0.8	0.7	1.66	0.9	0.9	7.7	48.	0.0	2.8
3	0.8	168.9	-0.3	15.96	0.8	0.7	1.01	0.8	0.8	7.3	41.	-0.9	2.7
4	0.8	168.8	-0.3	20.16	0.8	0.7	1.61	0.9	0.9	10.0	87.	-1.3	3.6
5	0.8	168.8	-0.4	21.38	0.8	0.7	1.65	0.8	0.7	9.8	102.	-2.0	3.5
6	0.8	168.8	-0.4	22.68	0.8	0.8	0.85	0.6	0.6	9.6	73.	-0.3	3.4
7	0.8	168.2	-0.5	-41.64	0.8	0.6	1.61	0.9	0.9	8.8	112.	-5.7	3.2
8	0.8	168.4	-0.5	-41.59	0.8	0.7	1.60	0.8	0.8	9.3	85.	-2.4	3.3
9	0.7	168.1	-0.2	14.04	0.7	0.7	1.61	0.8	0.8	9.4	73.	-0.4	3.3
10	0.8	168.5	-0.3	23.99	0.8	0.7	1.33	0.8	0.8	7.8	43.	0.2	2.6
11	0.8	168.5	-0.2	11.56	0.8	0.7	1.36	0.9	0.9	8.2	45.	-0.3	2.9
12	0.8	168.4	-0.3	23.86	0.8	0.7	1.30	0.8	0.8	7.5	48.	1.2	2.8
13	0.8	169.0	-0.3	23.49	0.8	0.7	1.05	0.9	0.9	10.1	88.	-3.4	3.3
14	0.9	169.5	-0.4	22.78	0.9	0.7	0.85	0.9	0.9	9.1	61.	1.2	3.4
15	0.9	169.3	-0.3	21.15	0.9	0.7	1.04	0.9	0.9	10.4	89.	-0.9	3.6
16	0.8	168.9	-0.3	23.84	0.8	0.7	1.65	0.7	0.6	11.5	66.	1.8	3.6
17	0.8	168.4	-0.4	23.24	0.8	0.6	1.66	0.8	0.8	9.5	47.	-1.5	3.0
18	0.8	168.2	-0.3	23.84	0.8	0.7	1.01	0.8	0.7	9.4	81.	-2.8	3.0
19	0.8	168.9	-0.3	20.56	0.8	0.7	1.19	0.8	0.7	9.1	79.	-0.6	3.3
20	0.9	169.4	-0.3	18.66	0.9	0.7	1.24	0.9	0.9	8.8	42.	-1.1	3.2
21	0.9	169.9	-0.3	29.65	0.9	0.8	0.99	0.9	0.9	9.7	38.	-0.7	3.4
22	0.9	169.8	-0.3	16.49	0.9	0.8	1.09	0.9	0.9	9.9	59.	-0.3	3.9
23	0.9	169.9	-0.4	20.38	0.9	0.8	1.00	1.0	0.9	9.5	45.	0.5	3.9
24	0.9	169.4	-0.3	19.41	0.9	0.7	0.94	0.8	0.7	9.9	41.	-0.6	4.1
25	0.9	169.5	-0.2	25.09	0.9	0.7	1.09	0.7	0.7	10.9	57.	-1.1	3.8
26	0.8	169.1	-0.3	20.70	0.8	0.7	0.95	0.9	0.9	9.8	44.	-1.4	3.6
27	0.9	169.3	-0.2	19.56	0.9	0.7	1.08	0.9	0.9	9.5	44.	-0.5	3.6
28	1.1	171.7	-0.5	12.11	1.1	1.1	3.41	0.9	0.8	7.5	96.	-0.8	4.8
29	1.2	172.5	-0.6	15.31	1.2	1.2	3.49	1.4	1.4	3.4	75.	-3.1	4.8
30	1.3	173.0	-0.6	17.49	1.1	1.3	3.48	1.3	1.3	7.9	75.	-0.4	4.8
31	1.5	174.4	-0.5	11.99	1.2	1.5	1.06	0.9	0.9	8.0	75.	-0.5	4.5
32	1.6	175.1	-0.5	15.28	1.0	1.6	1.05	1.3	1.1	7.3	75.	0.1	4.5
33	1.6	174.7	-0.5	14.57	1.0	1.6	1.10	1.2	1.1	7.3	75.	-0.9	4.6
34	1.5	174.2	-0.5	10.64	1.5	1.3	0.79	1.5	1.4	6.9	75.	-0.9	4.5
35	1.6	174.7	-0.6	14.51	1.6	1.3	0.80	1.4	1.3	6.5	90.	-1.6	4.6
36	1.5	174.3	-0.4	24.19	1.5	1.2	0.80	1.5	1.5	6.6	96.	-0.2	4.5
37	1.3	173.0	-0.5	15.76	1.3	1.0	4.35	1.5	1.4	8.6	87.	-0.7	5.3
38	1.3	172.8	-0.5	12.29	1.3	1.0	0.54	1.2	1.1	8.3	87.	0.1	5.3
39	1.4	173.6	-0.6	13.99	1.4	1.1	5.18	1.2	1.1	7.8	87.	-0.8	5.4
40	1.4	173.5	-0.5	10.75	1.3	1.4	2.01	1.0	0.9	6.9	87.	0.0	4.6
41	1.3	173.2	-0.4	17.77	1.2	1.3	1.77	1.0	0.9	7.8	87.	-0.9	4.9
42	1.5	174.0	-0.5	15.96	1.3	1.5	1.71	1.0	1.0	7.6	47.	-0.6	5.1
43	2.1	177.3	-0.8	12.60	2.1	1.9	4.60	2.1	2.0	7.7	58.	-1.7	6.3
44	2.1	177.3	-0.8	17.00	2.1	1.8	4.63	1.9	1.8	7.4	45.	-0.5	6.0
45	2.4	178.3	-0.7	12.86	2.4	1.6	4.64	1.8	1.7	7.4	46.	-0.6	5.9
46	2.3	178.1	-0.7	12.78	1.9	2.3	1.76	2.1	2.1	6.0	43.	-1.8	6.5
47	2.1	177.3	-0.9	10.56	2.1	2.0	1.84	1.6	1.5	6.0	46.	-0.8	6.0
48	2.2	177.7	-0.8	11.84	1.9	2.2	1.85	1.6	1.5	6.0	50.	-1.3	6.1

GAUGE ON 0 RADIAL FOR SHOTS 1-9. PROJECTILE NOISE PRESENT.

Table 6-1. Gauge 1 - 15 May

M198 TEST 15 MAY 79 ABERDEEN PG

GAUGE 2

SHOT	MAXIMUM PRESSURE PSI	DA	MIN PSI	TIME MIN MS	INIT REFL MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	1.1	172.0	-0.4	14.63	0.8	1.1	1.29	0.8	0.8	7.4	40.	-2.2	3.6
2	1.2	172.2	-0.4	15.56	1.0	1.2	1.13	1.4	1.0	7.6	40.	2.2	3.8
3	1.1	172.0	-0.4	15.50	0.9	1.1	1.24	0.9	0.9	7.4	41.	-3.5	3.7
4	1.3	173.2	-0.5	18.23	1.3	1.1	0.90	1.4	1.3	8.6	58.	-1.0	4.6
5	1.3	173.1	-0.4	19.84	1.3	1.1	0.91	1.4	1.3	8.5	70.	-0.3	4.5
6	1.3	173.0	-0.5	41.31	0.7	1.3	20.14	0.4	0.3	1.2	54.	0.7	4.6
7	1.2	172.3	-0.6	1.88	1.2	0.9	1.91	0.7	0.6	0.7	66.	-0.5	0.2
8	1.2	172.4	-0.6	1.88	1.2	0.7	1.90	0.7	0.6	0.7	56.	0.1	0.2
9	1.5	174.5	-0.6	1.89	1.5	0.5	1.91	0.8	0.7	0.6	58.	-0.5	0.2
10	1.0	170.5	-0.3	21.04	0.8	1.0	1.30	0.7	0.6	8.3	42.	0.3	3.7
11	1.0	170.9	-0.3	11.71	0.7	1.0	1.41	0.9	0.9	0.0	48.	-0.1	3.3
12	1.0	171.1			0.8	1.0	1.35	0.8	0.8	8.2	40.	-1.0	3.8
13	1.7	175.5	-0.3	22.63	1.7	1.0	0.85	1.6	1.5	10.7	24.	21.1	5.6
14	1.7	175.3	-0.5	21.19	1.7	0.9	0.86	1.5	1.4	9.3	30.	-0.3	4.6
15	1.8	175.7	-0.4	20.39	1.8	1.0	0.82	1.5	1.4	10.6	42.	-1.5	4.8
16	1.2	172.0	-0.3	20.84	1.2	1.0	0.84	1.3	1.2	9.6	61.	0.1	4.4
17	1.0	171.2	-0.5	23.09	1.0	0.9	0.96	1.2	1.1	9.4	38.	0.4	4.2
18	1.1	171.8	-0.4	20.93	1.1	1.0	1.10	1.3	1.2	9.6	58.	-0.7	4.3
19	1.1	171.5	-0.4	20.36	0.8	1.1	1.10	0.9	0.8	9.3	79.	-0.5	4.3
20	1.2	172.6	-0.4	19.31	0.7	1.2	1.31	0.8	0.8	9.7	34.	-0.5	4.2
21	1.2	172.6	-0.3	28.84	1.0	1.2	1.15	1.4	0.9	10.0	55.	-1.2	4.4
22	1.5	174.3	-0.4	15.40	1.5	1.1	0.82	1.7	1.6	9.8	41.	-1.0	5.2
23	1.4	173.8			1.4	1.1	0.86	1.6	1.5	8.9	32.	-5.4	5.2
24	1.4	173.9	-0.4	19.41	1.4	1.1	0.84	1.2	1.1	9.9	42.	-0.2	5.5
25	1.3	173.1	-0.3	24.38	1.3	1.0	0.86	1.5	1.4	10.7	57.	-0.4	5.2
26	1.3	173.2			1.3	1.0	0.86	1.5	1.5	10.7	43.	-2.6	5.0
27	1.3	173.0	-0.4	25.44	1.3	1.0	0.86	1.5	1.4	9.8	53.	-1.8	4.9
28	1.3	172.9	-0.7	17.43	1.3	1.2	4.56	1.4	1.1	4.3	111.	-0.9	5.4
29	1.4	173.9			1.4	1.4	5.20	1.6	1.5	4.4	162.	-6.0	5.0
30	1.4	173.5			1.4	1.3	4.63	1.5	1.4	4.4	148.	-2.0	5.3
31	1.5	174.2	-0.6	12.24	1.4	1.5	1.73	1.6	1.5	6.9	132.	-0.1	5.1
32	1.4	173.9	-0.6	18.40	1.4	1.4	1.75	1.5	1.4	6.9	103.	0.2	5.1
33	1.5	174.0	-0.6	18.54	1.3	1.5	1.73	1.4	1.3	6.4	48.	0.0	5.1
34	1.8	176.0	-0.5	10.29	1.8	1.6	0.89	1.6	1.5	6.7	60.	-1.3	5.2
35	2.0	176.9	-0.4	9.24	2.0	1.6	0.88	1.8	1.7	6.8	46.	0.1	5.4
36	1.8	175.9	-0.5	9.61	1.8	1.5	0.86	2.0	1.7	6.8	60.	-0.2	5.1
37	1.7	175.5	-0.6	14.40	1.7	1.5	5.39	1.4	1.3	4.3	94.	-2.5	4.1
38	1.7	175.4	-0.7	17.89	1.7	1.4	5.34	1.4	1.3	8.6	94.	-0.3	5.7
39	1.8	175.8	-0.7	16.33	1.8	1.7	6.09	1.4	1.3	4.3	94.	0.2	4.6
40	1.9	176.5	-0.6	14.40	1.5	1.9	1.90	1.2	1.2	6.7	53.	-1.2	5.3
41	1.8	175.9	-0.5	13.28	1.5	1.8	1.93	1.3	1.2	7.4	70.	0.0	5.6
42	1.9	176.2	-0.7	15.53	1.7	1.9	1.93	1.4	1.3	7.4	95.	-0.1	5.9
43	2.3	177.9	-0.8	21.81	2.3	2.3	5.49	2.5	2.4	5.4	59.	-0.7	7.1
44	2.6	179.1	-0.9	18.16	2.6	2.6	5.49	2.1	2.0	4.4	42.	-0.7	6.5
45	2.5	178.6	-0.8	16.14	2.5	2.3	5.51	2.0	1.8	5.4	57.	2.5	6.7
46	2.4	178.3	-0.8	13.35	2.4	2.4	2.35	1.9	1.8	6.2	59.	-1.2	7.4
47	2.1	177.3	-1.0	10.70	2.1	2.0	2.39	1.9	1.8	6.2	44.	1.0	7.1
48	2.4	178.5	-0.9	15.39	2.1	2.4	2.35	2.4	2.2	6.4	53.	1.6	7.4

GAUGE ON 0 RADIAL FOR SHOTS 1-9. PROJECTILE NOISE PRESENT.

Table 6-2. Gauge 2 - 15 May

M198 TEST 15 MAY 79 ABERDEEN PG

GAUGE 3

SHOT	MAXIMUM PRESSURE PSI	DB	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-MS	POS IMP	
1	1.6	174.7	-0.6	13.94	0.9	1.6	1.21	1.3	0.7	6.8	60.	-2.5	3.7	GAUGE ON 0
2	1.7	175.5	-0.6	13.89	1.2	1.7	1.74	1.3	1.3	7.3	55.	-1.4	4.5	RADIAL FOR SHOTS
3	1.6	174.9	-0.6	17.51	1.3	1.6	1.91	1.1	1.0	7.7	88.	-0.8	4.5	1-9. PROJECTILE
4	2.4	178.3	-0.7	18.31	2.4	1.6	0.88	2.5	2.3	8.7	49.	-3.8	5.8	NOISE PRESENT.
5	2.4	178.4	-0.7	18.48	2.4	1.4	0.90	2.1	1.9	7.7	55.	-5.0	5.6	
6	2.3	178.0	-0.7	19.46	2.3	1.5	0.88	2.1	1.9	7.0	44.	-3.3	5.3	
7	2.8	179.7	-1.4	1.71	2.8	1.2	1.80	1.5	1.1	0.2	60.	-0.1	0.2	
8	3.1	180.7	-1.4	1.71	3.1	1.9	1.77	1.7	1.4	0.2	65.	2.2	0.3	
9	3.2	180.9	-1.5	1.65	3.2	1.2	1.77	1.7	1.3	0.2	45.	-0.3	0.3	
10	1.7	175.2	-0.5	16.56	1.0	1.7	2.14	1.2	1.2	7.0	68.	2.0	4.5	
11	1.6	174.9	-0.5	13.53	1.1	1.6	2.23	1.2	1.2	8.3	67.	0.0	4.9	
12	1.9	176.4	-0.4	25.24	1.1	1.9	2.04	1.2	1.1	7.9	30.	-0.5	4.7	
13	2.5	178.6	-0.5	18.81	2.5	1.6	0.86	2.8	2.5	8.3	31.	-1.0	5.8	
14	2.6	179.1	-0.7	19.19	2.6	1.6	0.88	2.2	1.9	8.3	29.	1.5	6.0	
15	2.7	179.2	-0.5	18.39	2.7	1.7	1.63	2.8	2.5	7.7	30.	-1.6	5.9	
16	2.2	177.7	-0.5	19.55	2.2	1.4	0.86	2.3	2.1	7.7	52.	-0.2	5.8	
17	2.3	178.0	-0.7	23.43	2.3	1.4	0.85	1.9	1.8	7.5	31.	1.7	5.5	
18	2.2	177.4	-0.5	20.99	2.2	1.5	0.86	2.5	2.2	8.3	31.	2.8	5.7	
19	1.7	175.4	-0.6	19.60	1.3	1.7	2.23	1.5	1.3	8.5	38.	-0.2	5.2	
20	1.7	175.3	-0.5	19.44	1.1	1.7	2.24	1.2	1.1	9.0	92.	0.6	5.1	
21	1.8	175.8	-0.5	26.01	1.3	1.8	1.95	1.1	1.0	8.7	66.	-2.7	5.0	
22	2.6	179.1	-0.6	14.46	2.6	1.7	0.86	2.4	2.2	8.8	33.	-1.6	6.9	
23	2.3	178.0	-0.7	17.26	2.3	1.7	0.90	2.5	2.3	8.8	31.	0.9	7.1	
24	2.5	178.8	-0.5	25.18	2.5	1.8	0.85	2.8	2.6	9.5	32.	4.1	7.6	
25	2.4	178.4	-0.5	23.24	2.4	1.7	0.85	2.5	2.3	10.7	38.	-2.0	7.6	
26	2.3	178.1	-0.5	18.80	2.3	1.7	0.84	2.5	2.3	10.6	60.	-1.4	7.1	
27	2.5	178.6	-0.5	26.10	2.5	1.6	0.86	2.5	2.3	8.0	36.	0.4	6.8	
28	1.6	174.6	-0.8	12.79	1.0	1.6	4.16	1.4	1.2	3.3	121.	-8.2	1.9	
29	1.8	175.6	-0.7	15.84	1.6	1.8	5.05	1.4	1.2	4.3	104.	1.6	5.0	
30	1.6	174.8	-0.9	13.69	1.6	1.6	5.09	1.8	1.6	4.4	161.	0.4	2.9	
31	1.6	174.9	-0.7	12.75	1.6	1.4	2.21	1.7	1.7	6.7	61.	-0.6	4.9	
32	1.6	175.1	-0.7	15.04	1.6	1.6	2.21	1.8	1.6	6.6	83.	1.4	5.0	
33	1.5	174.4	-0.6	15.00	1.5	1.4	2.24	1.6	1.5	6.2	147.	2.8	4.8	
34	2.2	177.8	-0.6	10.44	2.2	1.7	0.95	2.6	2.3	6.5	57.	-2.6	4.8	
35	2.5	178.8	-0.6	9.93	2.5	1.6	0.94	2.9	2.5	6.5	53.	-0.9	4.9	
36	2.3	178.2	-0.6	10.80	2.3	1.8	0.89	2.5	2.2	6.2	56.	-2.0	4.8	
37	2.1	177.3	-1.0	13.85	2.1	1.7	5.58	2.2	2.0	3.8	168.	-1.7	5.1	
38	1.9	176.5	-1.0	14.74	1.9	1.5	6.34	1.9	1.7	2.7	0.	0.4	3.8	OSCILLATIONS IN
39	2.0	176.6	-1.0	13.95	2.0	1.9	2.79	2.0	1.7	3.8	0.	-1.4	3.2	GAUGE. RESULTS
40	1.9	176.2	-0.8	12.55	1.9	1.7	2.83	1.9	1.7	6.0	0.	2.8	5.1	QUESTIONABLE FOR
41	1.9	176.4	-0.9	13.20	1.9	1.5	2.85	2.0	1.8	6.4	0.	-0.3	5.2	SHOTS 38-42.
42	1.9	176.2	-0.8	14.85	1.9	1.6	2.86	1.7	1.5	6.0	0.	0.6	5.4	
43	3.0	180.2	-1.2	5.96	3.0	2.7	6.04	2.3	2.0	5.4	55.	0.7	4.6	
44	3.0	180.3	-1.1	5.97	3.0	2.6	6.05	2.1	1.9	3.2	48.	0.6	3.5	
45	2.8	179.8	-1.3	5.97	2.8	2.8	6.05	2.0	1.8	5.2	60.	1.5	3.9	
46	2.8	179.8	-1.2	10.93	2.8	2.6	2.83	2.1	1.9	7.6	57.	0.2	7.5	
47	2.7	179.2	-1.4	10.57	2.7	2.6	2.99	2.9	2.5	7.7	50.	2.1	7.0	
48	2.7	179.2	-1.2	15.81	2.7	2.5	2.81	3.0	2.8	6.4	46.	0.8	7.3	

Table 6-3. Gauge 3 - 15 May

M198 TEST 15 MAY 79 ABERDEEN PG

GAUGE 4

SHOT	MAXIMUM PRESSURE PSI	DB	MIN PST	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS	
1	2.5	178.8	-1.1	13.99	2.5	2.1	3.85	1.9	1.8	7.3	38.	-5.8	7.0	GAUGE ON 0
2	2.4	178.3	-0.9	12.53	2.4	2.2	3.84	2.1	2.0	8.6	67.	-0.5	7.6	RADIAL FOR SHOTS
3	2.2	177.7	-1.0	13.64	2.2	2.2	3.69	2.0	1.9	7.4	91.	-2.7	7.4	1-9. PROJECTILE
4	3.8	182.2	-1.4	16.66	1.0	3.8	2.38	0.6	0.5	0.8	44.	1.6	0.3	NOISE PRESENT.
5	3.6	182.0	-1.4	15.24	3.5	3.6	1.73	3.4	3.1	0.1	49.	-2.8	7.9	
6	4.0	182.8	-1.6	20.20	0.7	4.0	4.00	0.6	0.5	0.7	43.	-6.7	7.9	
7	6.7	187.3	-2.3	1.44	5.4	6.7	9.63	3.5	3.1	0.5	40.	-4.8	12.5	
8	7.6	188.4	-2.4	1.56	5.3	7.6	9.55	3.7	3.2	0.5	27.	-4.2	0.7	
9	7.7	188.5	-2.4	1.41	4.1	7.7	9.65	3.1	2.7	0.5	29.	-5.3	0.8	
10	2.1	177.3	-0.9	11.44	1.0	2.1	1.40	1.2	1.2	1.5	205.	-6.1	4.1	
11	2.2	177.6	-1.0	11.18	2.2	2.1	3.90	1.9	1.9	7.6	130.	-0.8	7.9	
12	2.3	178.0	-1.0	15.85	.3	2.3	3.92	1.7	1.5	7.6	140.	-3.5	7.4	
13	3.5	181.7	-1.1	15.10	3.3	3.5	1.93	2.4	2.2	7.1	56.	1.1	11.5	
14	3.6	181.9	-1.4	15.56	3.1	3.6	1.95	2.4	2.3	7.2	33.	-3.6	11.3	
15	4.1	182.9	-1.0	16.99	3.2	4.1	1.81	2.6	2.4	7.4	41.	-2.0	11.6	
16	5.8	186.1	-0.9	24.38	5.8	3.9	0.63	4.8	4.4	6.5	31.	-0.2	12.1	
17	5.4	185.3	-1.4	20.19	5.4	3.4	0.61	4.4	4.0	6.3	27.	-9.1	10.9	
18	5.1	184.9	-1.2	19.51	5.1	3.5	0.85	5.1	4.8	6.3	28.	-4.5	11.4	
19	2.7	179.5	-1.0	12.88	2.7	2.3	4.46	2.0	1.9	8.8	44.	-2.1	8.2	
20	2.7	179.2	-1.0	16.93	2.7	2.5	4.40	2.3	2.2	7.7	72.	-6.9	7.5	
21	2.5	178.7	-0.8	32.78	2.5	2.0	4.40	2.2	2.1	4.3	60.	-1.0	8.2	
22	4.1	183.0	-1.1	12.60	4.1	4.1	1.90	3.7	3.5	8.4	42.	2.8	14.2	
23	4.2	183.2	-1.4	13.30	4.2	3.6	1.94	3.2	3.0	8.3	31.	6.0	14.5	
24	4.2	183.2	-1.2	26.96	4.1	4.2	1.88	3.7	3.5	8.9	40.	11.7	15.1	
25	6.8	187.3	-1.5	28.10	6.8	4.1	0.56	5.2	4.9	0.0	68.	-82.3	9.9	SHOTS 25-27
26	7.0	187.7	-0.9	21.46	7.0	4.3	0.96	5.7	5.4	7.0	146.	131.1	14.3	QUESTIONABLE.
27	7.2	187.9	-1.0	22.30	7.2	4.6	0.53	5.7	5.4	6.3	151.	237.3	14.2	
28	1.8	175.7	-0.8	17.94	1.8	1.4	0.96	1.8	1.5	4.3	62.	-2.4	3.6	
29	1.6	175.1	-0.8	12.56	1.6	1.6	0.84	1.5	1.4	4.4	72.	-3.6	3.6	
30	1.9	176.1	-0.9	19.33	1.9	1.3	0.99	2.1	1.9	4.5	51.	-1.5	3.6	
31	1.8	176.0	-0.8	18.31	1.8	1.7	2.20	1.8	1.7	6.5	42.	-0.3	5.7	
32	2.1	177.1	-0.8	18.49	2.1	1.8	3.14	2.1	2.0	6.6	56.	1.6	5.7	
33	1.8	175.8	-0.8	18.44	1.8	1.8	3.09	1.4	1.3	6.4	57.	-1.0	5.6	
34	2.8	179.5	-0.7	9.56	2.8	1.9	1.05	3.0	2.8	6.4	55.	1.0	5.8	
35	3.2	180.8	-0.7	8.98	3.2	1.8	1.04	3.9	3.7	6.1	42.	-0.8	5.9	
36	2.9	179.9	-0.7	9.51	2.9	1.9	1.01	3.3	3.2	5.8	53.	-2.0	5.7	
37	2.4	178.2	-0.9	17.91	2.4	1.4	1.66	1.7	1.6	4.6	62.	-3.4	4.1	
38	2.3	177.9	-0.9	17.29	2.3	1.5	0.59	1.7	1.6	5.0	43.	-3.2	3.8	
39	2.6	179.1	-0.7	18.39	2.6	1.5	0.59	1.9	1.8	4.5	61.	-0.1	4.1	
40	2.2	177.4	-0.9	18.13	2.2	1.9	2.53	1.6	1.5	6.2	60.	0.4	6.0	
41	2.2	177.6	-0.8	18.44	2.2	1.7	3.80	1.6	1.5	5.3	54.	-0.5	5.9	
42	2.1	177.3	-1.2	12.25	2.1	2.0	2.53	1.5	1.4	6.7	53.	-3.6	6.5	
43	3.3	181.2	-0.9	15.41	3.3	2.6	0.61	2.5	2.4	5.7	54.	-1.8	4.9	
44	3.2	180.8	-1.1	12.69	3.2	2.2	0.59	2.6	2.4	4.1	45.	-0.8	4.3	
45	3.5	181.5	-1.2	18.19	3.5	2.2	0.59	2.7	2.6	4.0	49.	-1.3	4.2	
46	3.9	182.6	-1.3	10.79	3.9	2.7	3.94	2.9	2.8	6.6	40.	-1.2	8.2	
47	3.4	181.3	-1.5	11.79	3.4	2.8	3.53	2.6	2.5	7.1	43.	-0.7	7.7	
48	2.9	180.1	-1.4	12.10	2.9	2.7	3.53	2.8	2.7	3.4	49.	0.1	7.9	

Table 6-4. Gauge 4 - 15 May

M198 TEST 15 MAY 79 ABERDEEN PG

GAUGE 5

SHOT	MAXIMUM PRESSURE PSI	MAXIMUM PRESSURE DR	MIN PSI	TIME MIN MS	INIT REFL MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	0.5	164.4	-0.2	28.30	0.0	0.5	11.64	0.0	0.0		139.	0.3	1.7
2	0.5	164.7	-0.2	30.14	0.0	0.5	3.65	0.0	0.0		84.	-1.7	1.7
3	0.5	164.9	-0.2	30.86	0.0	0.5	4.44	0.0	0.0		62.	-0.4	1.7
4	0.5	164.5	-0.2	40.55	0.0	0.5	4.60	0.0	0.0		105.	-0.5	1.7
5	0.5	164.2	-0.2	47.41	0.0	0.5	11.06	0.0	0.0		87.	-0.6	
6	0.5	164.7	-0.2	34.19	0.0	0.5	8.60	0.0	0.0		143.	0.0	1.6
7	0.4	163.4	-0.2	27.29	0.4	0.4	1.58	0.4	0.4		133.	-0.7	1.7
8	0.5	164.9	-0.2	26.00	0.0	0.5	9.48	0.0	0.0		122.	-0.7	
9	0.4	163.6	-0.2	39.04	0.0	0.4	2.40	0.0	0.0		223.	0.5	
10	0.9	169.4	-0.3	20.44	0.9	0.8	0.94	0.9	0.9	6.9	34.	-0.4	2.5
11	0.8	169.1	-0.2	30.10	0.8	0.8	0.98	0.8	0.7	8.1	45.	-1.2	2.7
12	0.9	169.4	-0.3	15.34	0.9	0.8	0.96	0.8	0.8	7.3	41.	-0.2	2.6
13	0.8	169.0	-0.2	16.90	0.8	0.7	0.64	0.8	0.7	7.6	52.	-1.4	2.6
14	0.9	169.8	-0.4	18.55	0.9	0.7	0.54	0.8	0.8	8.3	50.	-0.1	2.6
15	0.8	169.2	-0.3	16.44	0.8	0.7	0.59	0.7	0.7	8.6	48.	-0.8	2.7
16	0.7	167.9	-0.2	26.99	0.7	0.6	0.56	0.6	0.6	8.2	75.	-3.4	2.5
17	0.8	168.2	-0.3	17.90	0.8	0.6	0.61	0.7	0.6	8.9	46.	-0.5	2.4
18	0.7	167.8	-0.3	17.75	0.7	0.6	0.53	0.6	0.6	8.1	48.	-0.4	2.5
19	0.8	168.9	-0.3	17.99	0.8	0.7	1.25	0.9	0.8	8.2	34.	-1.5	3.4
20	0.9	169.3	-0.3	17.04	0.9	0.8	0.84	0.8	0.8	8.2	34.	-1.3	3.4
21	1.0	170.4	-0.2	20.84	1.0	0.8	0.98	1.0	0.9	8.7	38.	-0.7	3.6
22	0.9	170.1	-0.3	15.95	0.9	0.7	0.56	0.8	0.8	9.5	37.	-0.5	3.7
23	0.9	170.1	-0.4	17.91	0.9	0.8	0.88	0.9	0.8	9.2	35.	-1.0	3.7
24	0.9	169.3	-0.3	19.93	0.9	0.8	1.49	0.7	0.7	10.0	47.	-1.6	3.9
25	0.7	168.1	-0.2	33.48	0.7	0.6	0.86	0.7	0.7	10.5	75.	-1.2	3.4
26	0.8	168.8	-0.2	17.18	0.8	0.7	0.88	0.7	0.7	9.5	45.	-1.4	3.3
27	0.8	168.9	-0.2	21.14	0.8	0.7	1.45	0.7	0.7	9.2	45.	-1.3	3.3
28	1.4	173.8	-0.6	17.70	1.4	1.1	4.21	1.3	1.2	9.4	82.	-0.9	5.1
29	1.4	173.5	-0.7	15.76	1.4	1.1	4.22	1.2	1.2	9.4	82.	-1.7	5.1
30	1.4	173.8	-0.6	11.99	1.4	1.3	4.30	1.2	1.2	9.6	50.	-1.2	4.9
31	1.4	173.8	-0.7	18.60	1.4	1.4	1.80	1.2	1.1	7.6	42.	0.6	4.9
32	1.4	173.9	-0.6	16.55	1.3	1.4	1.83	1.1	1.1	6.9	82.	-1.4	4.9
33	1.5	174.3	-0.6	15.05	1.1	1.5	3.05	1.0	1.0	7.6	83.	-0.6	5.0
34	1.6	174.7	-0.6	10.23	1.6	1.4	0.66	1.3	1.3	6.6	60.	-0.5	5.0
35	1.8	175.8	-0.6	9.56	1.8	1.5	1.19	1.8	1.7	6.4	60.	-0.2	5.1
36	1.7	175.3	-0.6	10.24	1.7	1.4	1.16	1.7	1.5	6.2	61.	-0.8	4.8
37	1.5	174.4	-0.8	17.98	1.5	1.5	5.04	1.2	1.2	4.4	72.	-2.2	5.2
38	1.5	174.3	-0.7	17.21	1.5	1.2	5.41	1.2	1.2	10.6	42.	-0.5	5.3
39	1.5	174.4	-0.7	15.19	1.5	1.4	5.28	1.3	1.2	4.1	82.	0.2	4.9
40	1.4	173.9	-0.7	16.99	1.1	1.4	2.24	1.0	1.0	7.3	67.	-0.3	4.9
41	1.4	173.9	-0.6	12.98	1.2	1.4	1.90	1.1	1.0	7.5	113.	-1.1	5.1
42	1.4	173.9	-0.7	14.50	1.4	1.4	1.90	1.2	1.1	7.8	51.	-1.5	5.3
43	1.7	175.1	-0.4	13.86	1.2	1.7	3.19	1.1	1.1	8.7	59.	-1.1	5.1
44	1.3	173.1	-0.5	14.32	1.2	1.3	3.40	1.1	1.1	8.7	57.	-1.2	4.8
45	1.5	174.2	-0.5	15.43	1.3	1.5	3.25	1.0	1.0	8.0	57.	-1.3	4.6
46	1.4	173.7	-0.4	11.26	1.4	1.4	1.00	1.7	1.6	7.5	57.	-1.1	4.7
47	1.3	173.0	-0.5	11.39	1.3	1.3	1.06	1.5	1.4	6.8	45.	-3.2	4.3
48	1.4	173.8	-0.5	10.99	1.4	1.3	1.43	1.6	1.5	7.3	51.	-0.4	4.7

Table 6-5. Gauge 5 - 15 May

M198 TEST 15 MAY 79 ABERDEEN PG

GAUGE 6

SHOT	MAXIMUM PRESSURE PSI	DR	MIN PSI	TIME MIN MS	INIT REFL MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	0.6	166.7	-0.3	18.30	0.6	0.5	2.35	0.5	0.4	10.1	109.	0.0	2.7
2	0.6	167.0	-0.3	17.48	0.6	0.6	2.35	0.5	0.5	10.1	99.	0.2	2.7
3	0.6	167.0	-0.3	23.29	0.6	0.5	2.30	0.5	0.4	9.7	109.	0.0	2.7
4	0.9	170.0	-0.3	38.95	0.9	0.7	0.64	0.8	0.8	9.9	70.	-0.5	2.6
5	0.9	169.5	-0.2	39.58	0.9	0.6	0.63	0.8	0.7	9.4	70.	-0.4	2.6
6	0.9	169.7	-0.3	24.81	0.9	0.6	0.89	0.7	0.7	9.3	62.	0.7	2.5
7	0.8	168.5	-0.3	39.01	0.8	0.6	0.88	0.6	0.6	9.9	92.	0.2	2.4
8	0.8	168.7	-0.3	39.13	0.8	0.6	0.88	0.6	0.6	10.7	93.	0.1	2.5
9	0.8	168.9	-0.3	40.20	0.8	0.6	0.51	0.7	0.7	9.8	94.	-0.6	2.4
10	1.4	173.7	-0.3	18.10	0.8	1.4	1.52	0.7	0.6	6.7	32.	-0.1	3.5
11	1.2	172.5	-0.3	30.19	0.9	1.2	1.48	0.8	0.6	8.5	39.	-0.5	3.9
12	1.2	172.6	-0.4	15.24	0.9	1.2	1.48	0.7	0.6	7.9	34.	-0.7	3.7
13	1.5	174.1	-0.3	15.34	1.5	1.1	0.88	1.1	0.9	7.5	39.	-1.7	3.5
14	1.4	173.4	-0.4	17.99	1.4	1.0	0.88	1.1	0.9	8.0	43.	0.0	3.5
15	1.5	174.0	-0.3	15.28	1.5	1.1	0.88	1.1	0.9	8.2	43.	-0.3	3.6
16	1.2	172.4	-0.3	28.81	1.2	1.0	0.88	1.0	0.9	8.4	41.	-0.3	3.5
17	1.2	172.2	-0.4	17.09	1.2	1.0	0.86	0.9	0.8	8.7	45.	-0.4	3.2
18	1.2	172.3	-0.3	17.98	1.2	1.0	0.88	0.9	0.8	8.1	47.	-0.9	3.3
19	1.3	172.7	-0.4	15.57	1.0	1.3	1.27	0.8	0.7	9.0	35.	0.2	4.8
20	1.3	173.0	-0.5	14.34	0.9	1.3	1.31	0.7	0.6	8.8	41.	-0.7	4.7
21	1.4	173.9	-0.3	24.27	1.0	1.4	1.25	0.7	0.6	9.1	38.	-1.3	4.9
22	1.5	174.3	-0.4	14.19	1.5	1.1	0.88	1.3	1.1	8.7	36.	-2.2	5.0
23	1.7	175.1	-0.6	16.64	1.7	1.2	0.89	1.3	1.1	8.4	34.	-1.5	5.1
24	1.5	174.4	-0.4	17.98	1.5	1.1	0.89	1.2	1.0	9.3	35.	-0.2	5.4
25	1.4	173.4	-0.3	33.59	1.4	1.1	0.78	1.0	0.9	9.1	45.	-0.4	4.8
26	1.4	173.9	-0.3	22.21	1.4	1.1	0.78	1.1	1.0	8.7	42.	-1.6	4.7
27	1.4	173.9	-0.3	27.19	1.4	1.2	0.79	1.1	0.9	8.4	40.	-0.8	4.8
28	2.0	176.9	-0.8	15.16	2.0	1.6	0.54	1.8	1.7	4.6	60.	-1.0	3.3
29	2.0	176.6	-0.9	16.94	2.0	1.7	5.29	1.5	1.4	4.4	58.	-0.5	4.9
30	2.0	176.7	-0.8	16.96	2.0	1.6	0.55	1.8	1.6	4.6	48.	-1.0	3.2
31	1.8	176.0	-0.8	14.51	1.8	1.6	2.16	1.5	1.3	7.6	34.	-1.0	5.4
32	1.8	175.9	-0.8	17.43	1.7	1.8	2.19	1.7	1.5	6.9	57.	-1.5	5.5
33	1.8	175.7	-0.7	14.78	1.8	1.6	2.23	1.4	1.2	6.6	53.	-1.6	5.4
34	2.3	178.0	-0.6	11.30	2.3	2.3	0.55	2.0	1.8	6.4	50.	-1.6	5.5
35	2.3	178.1	-0.6	13.80	2.3	1.5	1.79	2.2	1.8	6.4	54.	2.0	5.7
36	2.2	177.6	-0.6	9.41	2.2	1.7	0.79	1.5	1.3	6.2	55.	-1.3	5.4
37	1.7	175.3	-0.9	17.85	1.7	1.4	0.55	1.5	1.4	5.0	66.	-2.9	3.4
38	1.8	175.9	-0.8	15.66	1.8	1.4	5.30	1.3	1.2	4.0	40.	-0.4	5.3
39	1.8	175.9	-0.7	15.56	1.8	1.4	0.94	1.5	1.2	4.5	59.	-0.3	3.4
40	2.2	177.5	-0.7	13.07	1.6	2.2	2.34	1.4	1.3	7.2	38.	0.7	5.5
41	1.8	176.0	-0.7	12.79	1.7	1.8	2.35	1.3	1.1	7.0	58.	-4.0	5.6
42	1.8	175.7	-0.7	12.31	1.8	1.7	2.35	1.3	1.2	7.4	52.	-0.8	6.0
43	1.8	175.9	-0.5	12.19	1.8	1.6	3.73	1.2	1.1	9.1	54.	-2.4	6.0
44	1.8	175.9	-0.6	16.91	1.8	1.6	3.73	1.3	1.2	8.7	45.	-0.9	5.6
45	1.8	175.6	-0.6	15.26	1.8	1.6	3.75	1.2	1.1	9.0	47.	-2.9	5.4
46	1.9	176.5	-0.6	10.31	1.9	1.4	1.54	2.4	2.0	6.7	42.	-0.8	5.5
47	1.8	176.0	-0.6	11.34	1.8	1.4	1.45	2.3	2.0	6.5	42.	0.0	5.2
48	1.9	176.3	-0.7	10.84	1.9	1.5	1.44	2.3	2.0	7.3	49.	-2.9	5.5

Table 6-6. Gauge 6 - 15 May

M198 TEST 15 MAY 79 ABERDEEN PG

GAUGE 7

SHOT	MAXIMUM PRESSURE PSI	MAXIMUM PRESSURE DB	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	0.9	169.8	-0.4	15.51	0.8	0.9	3.03	0.8	0.8	8.2	109.	0.5	3.8
2	1.0	170.6	-0.4	14.54	0.9	1.0	3.24	0.8	0.8	8.0	109.	0.1	3.9
3	1.0	170.5	-0.4	14.05	1.0	0.9	2.90	0.8	0.8	8.1	108.	0.4	4.0
4	1.2	172.1	-0.3	34.70	1.2	1.0	0.90	1.2	1.1	6.8	46.	0.3	3.8
5	1.1	171.7	-0.4	10.24	1.1	0.9	1.11	1.2	1.1	7.6	76.	-0.3	3.8
6	1.1	171.7	-0.4	12.41	1.1	0.9	1.06	1.1	1.1	7.3	108.	0.4	3.5
7	1.3	172.7	-0.3	14.96	1.3	1.1	0.54	1.1	1.1	6.6	43.	0.9	3.4
8	1.2	172.5	-0.3	14.50	1.2	1.1	0.54	1.1	1.1	6.8	99.	0.1	3.5
9	1.3	172.8	-0.4	13.70	1.3	1.1	0.55	1.1	1.1	7.0	84.	-1.1	3.5
10	1.6	174.7	-0.5	13.96	1.3	1.6	2.63	1.0	1.0	7.1	41.	0.0	5.0
11	1.5	174.5	-0.4	29.01	1.3	1.5	2.61	1.1	1.1	7.7	62.	-0.8	5.4
12	1.5	174.5	-0.5	16.00	1.2	1.5	2.58	1.1	1.0	8.0	48.	-0.2	5.3
13	1.9	176.3	-0.4	28.18	1.9	1.7	0.53	1.7	1.6	6.8	63.	-1.2	5.1
14	1.9	176.1	-0.7	15.53	1.9	1.6	0.54	1.6	1.5	7.3	41.	0.2	5.1
15	1.8	176.0	-0.4	14.85	1.8	1.7	0.54	1.7	1.7	7.4	46.	-0.4	5.3
16	1.7	175.4	-0.4	33.25	1.7	1.5	0.55	1.5	1.5	7.7	51.	-0.6	5.2
17	1.7	175.3	-0.5	14.57	1.7	1.4	0.54	1.5	1.5	7.1	65.	0.4	4.7
18	1.7	175.5	-0.5	15.49	1.7	1.5	0.54	1.5	1.5	7.2	65.	-0.7	4.8
19	1.7	175.6	-0.6	17.27	1.2	1.7	2.34	1.1	1.1	8.8	36.	0.1	6.6
20	1.7	175.4	-0.7	15.86	1.3	1.7	2.34	1.1	1.1	8.2	33.	-1.1	6.3
21	1.8	175.7	-0.4	23.44	1.3	1.8	2.31	1.1	1.1	10.8	42.	1.4	7.0
22	2.3	178.1	-0.6	12.96	2.3	2.0	0.55	2.1	2.0	9.0	35.	-1.4	7.8
23	2.3	177.9	-0.8	16.13	2.3	2.0	0.57	2.0	2.0	8.8	34.	-0.6	7.9
24	2.4	178.2	-0.5	17.23	2.4	2.0	0.56	2.0	2.0	9.5	34.	0.1	8.4
25	2.1	177.1	-0.4	32.95	2.1	1.8	0.57	1.9	1.8	10.3	45.	-1.2	7.8
26	2.1	177.1	-0.4	22.18	2.1	1.9	0.56	1.8	1.8	9.1	69.	-0.9	7.4
27	2.2	177.5	-0.4	22.79	2.2	1.8	0.59	1.9	1.9	8.8	43.	-1.1	7.6
28	2.0	176.7	-0.7	15.10	2.0	1.4	0.63	1.9	1.9	4.0	66.	-0.4	3.5
29	2.0	176.5	-0.7	21.21	2.0	1.5	0.59	1.8	1.7	4.0	70.	0.3	3.5
30	1.9	176.5	-0.7	16.83	1.9	1.5	0.59	1.8	1.7	4.7	50.	0.2	3.5
31	1.6	174.9	-0.7	18.21	1.6	1.5	2.65	1.8	1.7	7.8	157.	0.0	5.8
32	1.6	174.6	-0.7	17.98	1.6	1.4	2.70	1.9	1.8	7.2	72.	1.2	5.8
33	1.5	174.4	-0.7	14.66	1.5	1.5	3.36	1.7	1.6	6.4	88.	1.0	5.6
34	2.1	177.0	-0.6	11.40	2.1	1.7	1.16	2.3	2.2	6.4	59.	-1.6	5.8
35	2.2	177.6	-0.6	11.74	2.2	1.7	1.13	2.6	2.5	6.5	66.	-2.1	5.8
36	2.2	177.6	-0.6	22.74	2.2	1.8	1.02	2.4	2.4	6.4	57.	-0.3	5.7
37	1.8	175.9	-0.7	18.24	1.8	1.6	0.59	1.6	1.5	4.7	65.	-0.9	3.6
38	1.7	175.4	-0.8	16.89	1.7	1.5	0.61	1.5	1.4	4.4	40.	0.5	3.3
39	1.8	175.9	-0.7	15.43	1.8	1.6	0.59	1.6	1.6	4.6	62.	-0.7	3.6
40	1.6	174.8	-0.8	19.14	1.6	1.6	3.48	1.4	1.4	7.3	73.	-3.3	5.6
41	1.6	174.7	-0.7	18.33	1.6	1.6	3.48	1.3	1.3	7.9	75.	-0.7	5.9
42	1.8	175.8	-0.7	18.84	1.7	1.8	3.10	1.7	1.7	7.9	52.	-0.5	6.2
43	2.1	177.1	-0.6	15.53	2.1	1.6	5.70	1.8	1.8	4.7	65.	-1.1	5.8
44	2.1	177.1	-0.7	22.49	2.1	1.9	5.71	1.8	1.7	4.2	41.	0.2	5.4
45	2.0	176.5	-0.8	17.31	1.9	2.0	5.71	1.7	1.7	4.3	45.	0.7	5.4
46	2.2	177.6	-0.8	13.34	2.2	1.7	2.89	2.6	2.3	7.4	65.	-5.6	6.0
47	1.9	176.4	-0.7	17.05	1.9	1.6	3.61	2.4	2.0	6.6	64.	-0.5	5.6
48	2.0	176.8	-0.8	16.86	2.0	1.7	3.58	2.5	2.2	6.6	49.	-0.6	5.8

Table 6-7. Gauge 7 - 15 May

M198 TEST 15 MAY 79 ABERDEEN PG

GAUGE 8

SHOT	MAXIMUM PRESSURE PSI	DR	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS	
1	2.2	177.7	-1.0	16.76	2.2	1.5	0.59	2.0	2.0	5.0	46.	-1.5	3.7	
2	2.4	178.2	-0.9	15.48	2.4	1.6	5.43	2.0	2.0	5.3	49.	-4.3	6.2	
3	2.4	178.5	-1.0	13.28	2.4	1.8	5.45	2.0	2.0	5.3	46.	-5.6	6.2	
4	2.2	177.5	-0.9	10.68	2.2	1.8	2.09	1.9	1.8	7.6	58.	-3.3	7.3	
5	2.1	177.0	-1.0	14.80	2.1	1.8	2.29	1.9	1.8	7.8	57.	-1.0	7.1	
6	2.0	176.9	-1.1	9.88	2.0	1.8	2.24	1.8	1.8	7.5	45.	-2.0	6.7	
7	2.5	178.9	-0.9	12.34	2.5	1.9	0.57	2.5	2.4	6.0	44.	-1.7	6.2	
8	2.6	179.2	-0.8	12.40	2.6	1.9	0.55	2.5	2.4	6.8	57.	-1.9	6.6	
9	2.6	179.2	-0.9	9.51	2.6	1.9	0.56	2.5	2.5	6.7	56.	-2.7	6.5	
10	3.4	181.3	-1.0	15.45	3.4	2.1	0.60	2.5	2.4	5.0	42.	-0.6	5.8	
11	3.6	181.9	-0.9	13.45	3.6	2.3	1.13	2.7	2.6	4.7	53.	0.8	6.0	
12	3.0	180.3	-1.1	15.82	3.0	2.3	0.60	2.5	2.4	4.8	42.	0.6	6.0	
13	3.6	181.8	-1.1	11.96	3.6	3.3	2.10	2.7	2.6	5.8	42.	0.1	10.1	
14	3.3	181.2	-1.4	14.99	3.2	3.3	2.14	2.8	2.6	6.3	34.	-0.8	10.0	
15	3.5	181.7	-1.1	14.26	3.5	3.3	2.11	2.8	2.6	5.9	46.	-3.0	9.9	
16	4.8	184.4	-0.8	10.95	4.8	3.4	0.54	4.5	4.4	4.8	38.	0.3	9.8	
17	4.6	184.0	-1.3	12.96	4.6	3.4	0.54	4.4	4.2	4.7	30.	-1.6	9.1	
18	4.7	184.2	-1.2	11.91	4.7	3.4	0.68	4.3	4.1	5.0	44.	-3.3	9.3	
19	3.4	181.3	-1.1	15.88	3.4	2.4	5.03	2.9	2.8	4.9	34.	-2.6	9.7	
20	3.5	181.7	-1.0	16.15	3.5	2.6	4.99	3.0	2.9	4.9	33.	-2.6	9.5	
21	3.5	181.7	-0.7	31.29	3.5	2.4	0.57	2.9	2.8	4.9	46.	-1.4	6.2	
22	4.2	183.3	-1.1	9.90	4.2	3.5	2.05	3.7	3.5	8.2	179.	111.4	15.3	TRANSDUCER PROBLEMS
23	4.1	183.1	-1.8	16.23	4.1	3.6	1.93	3.5	3.3	8.2	34.	-12.1	15.2	STARTING AT SHOT 22
24	3.9	182.6	-1.1	25.99	3.9	3.6	1.84	3.8	3.7	8.5	179.	91.3	16.4	ALL DATA FROM GAUGE 8
25	5.2	185.1	-0.9	23.50	5.2	3.8	0.55	4.9	4.8	10.4	0.	422.8	17.3	IS QUESTIONABLE FOR
26	5.2	185.1	-1.0	28.25	5.2	3.7	0.56	4.9	4.8	8.4	0.	287.1	15.3	REMAINDER OF TEST
27	5.2	185.1	-1.1	31.20	5.2	3.8	0.55	4.9	4.9	8.6	0.	410.9	15.9	
28	2.3	178.2	-0.9	15.13	2.3	1.7	0.60	2.1	2.0	4.9	59.	-1.7	4.2	
29	2.2	177.5	-0.9	17.11	2.2	1.7	0.57	2.0	1.9	3.5	58.	-2.7	3.7	
30	2.3	178.0	-0.9	17.65	2.3	1.8	0.65	2.0	1.9	3.5	40.	-1.7	3.6	
31	1.9	176.3	-1.0	16.68	1.9	1.8	0.85	2.0	2.0	6.4	49.	-1.9	6.2	
32	2.2	177.6	-1.0	17.10	2.2	1.7	0.86	1.7	1.5	6.3	59.	-2.2	6.1	
33	2.3	177.8	-1.0	15.11	2.3	1.6	0.85	1.6	1.5	6.2	49.	-2.9	6.2	
34	2.3	177.9	-0.8	7.94	2.3	2.0	0.78	2.0	1.9	6.2	58.	-0.3	6.2	
35	2.4	178.2	-0.8	8.36	2.4	2.0	0.82	2.1	2.0	5.9	60.	-2.6	6.3	
36	2.1	177.2	-0.8	23.58	2.1	2.1	0.82	1.9	1.8	6.2	61.	-2.7	6.1	
37	2.1	177.1	-0.9	17.74	2.1	1.6	0.56	1.9	1.9	4.9	60.	0.0	4.3	
38	1.9	176.3	-1.2	16.44	1.9	1.6	0.79	1.9	1.9	4.8	44.	-2.3	4.2	
39	2.0	176.9	-1.0	16.55	2.0	1.8	0.59	1.8	1.8	4.1	63.	-3.7	4.2	
40	1.9	176.5	-1.1	18.63	1.9	1.7	3.46	1.7	1.7	6.3	60.	-2.7	6.3	
41	2.1	177.2	-1.0	12.64	2.1	1.6	0.90	1.8	1.7	6.3	62.	-1.9	6.3	
42	2.3	177.9	-1.1	12.74	2.3	1.7	0.59	2.0	1.9	6.5	49.	-1.0	6.7	
43	2.2	177.6	-0.9	14.16	2.2	1.8	0.66	2.1	2.0	5.5	70.	-3.3	4.6	
44	2.1	177.2	-0.8	19.69	2.1	1.6	1.01	2.1	2.0	5.4	43.	-2.4	4.2	
45	2.1	177.1	-0.9	16.27	2.1	1.6	0.74	2.1	2.0	3.7	41.	-0.3	3.6	
46	2.1	177.2	-1.1	17.48	2.1	1.9	0.56	2.0	2.0	5.7	59.	-0.3	6.3	
47	2.0	176.8	-0.9	12.79	2.0	1.7	0.61	2.0	1.9	5.6	47.	0.1	5.9	
48	2.0	176.9	-1.0	15.57	2.0	1.8	3.05	2.6	2.3	6.2	44.	-0.9	6.2	

Table 6-8. Gauge 8 - 15 May

M198 TEST 15 MAY 79 ABERDEEN PG

GAUGE 9

SHOT	MAXIMUM PRESSURE PSI	DR	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	1.1	171.3	-0.5	16.20	0.9	1.1	2.88	0.9	0.8	6.9	90.	1.3	3.4
2	1.0	171.1	-0.5	16.50	1.0	1.0	2.76	0.9	0.9	6.6	92.	0.7	3.5
3	1.1	171.3	-0.4	15.14	1.0	1.1	2.89	0.9	0.9	6.8	90.	0.4	3.5
4	1.2	172.5	-0.4	13.55	1.2	1.1	1.56	1.3	1.2	7.3	81.	-0.1	3.8
5	1.1	171.7	-0.4	18.29	1.1	1.0	1.48	1.2	1.1	7.3	90.	0.7	3.5
6	1.2	172.1	-0.4	13.81	1.2	1.0	1.34	1.4	1.3	6.4	90.	0.1	3.4
7	1.4	173.5	-0.4	24.85	1.4	1.2	0.51	1.2	1.2	6.8	50.	0.5	3.6
8	1.3	173.0	-0.4	24.30	1.3	1.0	0.94	1.3	1.2	7.0	76.	0.3	3.6
9	1.3	173.0	-0.4	11.10	1.3	1.0	0.94	1.2	1.1	6.6	57.	-0.5	3.5
10	1.0	170.7	-0.5	16.77	0.8	1.0	2.78	0.8	0.7	7.4	105.	1.1	3.7
11	1.1	171.4	-0.5	13.35	0.9	1.1	2.91	0.8	0.8	7.7	66.	0.6	4.0
12	1.0	170.5	-0.6	13.44	0.8	1.0	2.88	0.8	0.8	8.2	106.	0.6	3.9
13	1.1	171.7	-0.4	14.14	1.1	1.1	1.33	1.1	1.1	7.3	65.	0.2	3.7
14	1.1	171.7	-0.4	14.05	1.1	1.0	1.23	1.1	1.1	7.5	65.	0.2	3.8
15	1.1	171.9	-0.4	19.49	1.1	1.0	1.20	1.1	1.1	7.6	65.	-2.2	3.6
16	1.1	171.7	-0.4	24.52	1.1	1.0	1.20	1.2	1.1	7.7	87.	-0.4	3.8
17	1.1	171.3	-0.4	11.41	1.1	1.0	0.54	0.9	0.9	7.1	88.	0.7	3.5
18	1.1	171.4	-0.4	12.63	1.1	0.9	1.20	1.1	1.0	6.9	88.	0.0	3.5
19	1.1	171.3	-0.5	15.53	1.0	1.1	2.84	0.9	0.8	8.4	79.	-0.8	4.0
20	1.2	172.1	-0.5	13.73	0.9	1.2	3.05	0.9	0.8	8.4	78.	1.1	4.1
21	1.2	172.3	-0.5	14.93	1.0	1.2	2.84	0.9	0.9	7.7	100.	-0.2	4.2
22	1.2	172.5	-0.4	18.13	1.2	1.0	1.20	1.3	1.2	7.4	88.	0.0	3.7
23	1.3	172.8	-0.4	18.56	1.3	1.0	1.30	1.6	1.4	7.4	98.	-0.8	3.7
24	1.2	172.4	-0.4	10.94	1.2	1.0	1.34	1.4	1.3	7.5	69.	0.0	3.9
25	1.2	172.1	-0.4	13.16	1.2	1.2	0.54	1.1	1.0	7.4	89.	-0.5	3.7
26	1.2	172.4	-0.4	13.21	1.2	1.0	0.99	1.1	1.1	7.3	97.	-1.0	3.6
27	1.2	172.4	-0.4	13.50	1.2	1.1	0.55	1.0	1.0	6.8	57.	-0.2	3.6
28	1.3	172.8	-0.5	17.61	1.2	1.3	3.31	1.0	1.0	8.0	71.	0.6	4.4
29	1.3	172.9	-0.5	15.41	1.2	1.3	3.51	1.1	1.0	7.1	70.	0.6	4.3
30	1.2	172.5	-0.5	11.11	1.1	1.2	3.83	1.0	1.0	8.1	71.	0.2	4.2
31	1.2	172.3	-0.5	18.30	1.1	1.2	1.16	1.0	0.9	7.0	97.	0.2	4.0
32	1.3	172.9	-0.5	17.24	1.1	1.3	1.58	0.9	0.9	6.9	97.	1.1	4.1
33	1.2	172.4	-0.5	14.86	0.9	1.2	1.95	0.9	0.9	6.5	70.	0.2	4.1
34	1.4	173.9	-0.4	10.36	1.4	1.3	1.01	1.4	1.3	6.4	69.	-0.3	4.1
35	1.5	174.3	-0.5	9.90	1.5	1.3	0.96	1.5	1.3	6.2	85.	-0.3	4.1
36	1.4	173.9	-0.4	10.13	1.4	1.3	0.99	1.4	1.4	6.1	70.	0.2	4.0
37	1.2	172.1	-0.6	12.07	1.2	1.1	3.79	1.0	1.0	8.4	82.	-0.3	4.6
38	1.2	172.1	-0.5	13.57	1.2	1.1	3.76	1.1	1.0	8.8	82.	0.6	4.6
39	1.1	171.5	-0.5	12.80	1.1	1.1	3.73	1.0	1.0	8.3	82.	0.1	4.7
40	1.2	172.3	-0.5	11.09	1.0	1.2	1.25	0.9	0.9	7.5	82.	0.0	4.1
41	1.2	172.5	-0.5	13.10	0.9	1.2	1.26	0.9	0.9	7.9	82.	-0.7	4.3
42	1.2	172.6	-0.5	11.53	1.0	1.2	1.26	0.9	0.9	8.2	45.	0.2	4.5
43	1.0	170.7	-0.4	14.20	0.9	1.0	3.06	0.8	0.8	8.4	99.	-1.4	4.3
44	1.0	171.0	-0.5	13.98	0.9	1.0	3.09	0.8	0.8	8.3	74.	-0.2	3.9
45	1.0	171.1	-0.5	12.74	0.9	1.0	3.14	0.9	0.8	8.4	99.	0.7	3.9
46	1.1	172.0	-0.5	14.07	0.9	1.1	1.13	1.0	0.9	7.4	90.	-1.5	3.8
47	1.0	171.2	-0.5	14.79	0.9	1.0	1.19	0.8	0.6	7.6	74.	-0.2	3.6
48	1.2	172.5	-0.5	18.58	0.8	1.2	1.16	0.8	0.8	8.3	74.	0.2	3.8

Table 6-9. Gauge 9 - 15 May

M198 TEST 15 MAY 79 ABERDEEN PG

GAUGE 10

SHOT	MAXIMUM PRESSURE PSI	DB	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	2.2	177.6	-1.0	16.02	2.2	1.9	0.54	1.9	1.8	3.6	52.	-0.3	3.8
2	2.3	178.1	-1.0	16.66	2.3	1.6	1.04	2.7	2.5	5.8	45.	4.1	4.7
3	2.2	177.6	-0.9	17.88	2.2	1.5	1.18	2.6	2.4	3.3	157.	1.3	3.7
4	2.8	179.5	-0.9	18.09	2.4	2.8	3.79	2.6	2.4	6.9	61.	1.4	7.5
5	2.7	179.3	-0.9	15.44	2.5	2.7	3.73	2.9	2.8	6.4	66.	-0.1	6.9
6	2.3	178.1	-1.0	19.80	2.2	2.3	3.70	1.9	1.8	6.2	44.	-0.4	6.8
7	2.4	178.5	-1.2	8.36	2.3	2.4	1.89	2.3	2.1	4.6	50.	-0.7	7.0
8	2.6	179.1	-1.0	8.59	2.3	2.6	1.56	2.0	1.9	5.5	60.	-0.6	7.4
9	2.5	178.7	-0.9	8.63	2.3	2.5	2.11	2.2	2.1	4.7	56.	0.7	7.1
10	2.3	178.1	-0.9	20.00	2.3	2.0	0.54	1.9	1.8	4.0	45.	3.2	4.0
11	2.2	177.8	-0.9	18.89	2.2	1.[illegible]	1.20	2.7	2.5	4.2	54.	-0.7	4.3
12	2.3	178.0	-0.9	21.35	2.3	1.[illegible]	1.24	2.7	2.5	5.7	44.	-0.1	4.7
13	2.3	177.9	-0.9	14.26	2.3	2.[illegible]	4.01	3.0	2.6	6.5	58.	-0.1	7.3
14	2.3	178.1	-0.9	19.69	2.3	2.3	4.03	2.0	1.9	6.9	53.	1.2	7.5
15	2.7	179.2	-1.0	15.24	2.3	2.7	3.49	2.5	2.4	6.2	74.	-0.9	7.0
16	2.8	179.8	-1.1	8.60	2.5	2.8	2.21	2.1	2.1	4.7	56.	0.6	7.6
17	2.3	178.0	-1.4	9.70	2.3	2.3	1.15	1.8	1.8	4.4	45.	2.3	6.9
18	2.5	178.9	-1.1	8.44	2.2	2.5	1.69	2.3	2.2	5.2	55.	0.7	7.2
19	2.2	177.7	-0.9	16.73	2.2	1.5	0.96	2.2	2.0	4.1	45.	-1.7	4.1
20	2.3	177.9	-0.8	22.45	2.3	1.9	0.55	1.9	1.8	3.7	50.	1.0	3.9
21	2.3	178.1	-1.0	15.29	2.3	2.1	0.54	2.1	2.0	5.9	61.	0.3	5.0
22	2.6	178.9	-1.0	17.15	2.2	2.6	3.56	2.2	2.1	6.4	55.	0.6	7.2
23	2.4	178.4	-1.0	14.05	2.4	2.0	3.79	2.0	2.0	7.0	50.	1.3	7.4
24	2.7	179.2	-1.0	13.36	2.3	2.7	4.01	2.2	2.1	5.9	49.	0.4	7.5
25	2.5	178.7	-0.9	8.74	2.5	2.4	2.88	2.9	2.6	4.6	56.	-3.2	7.5
26	2.5	178.6	-0.9	8.24	2.3	2.5	1.04	2.5	2.4	4.5	62.	-2.0	7.3
27	2.5	178.7	-1.1	8.30	2.5	2.5	2.63	2.9	2.6	4.6	60.	1.3	7.6
28	2.4	178.3	-0.8	18.16	2.4	1.6	1.05	2.8	2.5	4.3	61.	-1.5	4.2
29	2.2	177.5	-0.9	16.36	2.2	2.0	0.69	1.9	1.9	4.5	67.	0.9	4.3
30	2.1	177.1	-0.9	12.68	2.1	1.9	0.66	1.9	1.8	3.9	52.	-0.1	4.1
31	2.4	178.4	-1.1	17.91	2.4	2.0	0.55	2.0	1.9	6.2	45.	-0.4	6.9
32	2.4	178.5	-1.0	15.76	2.1	2.4	3.90	2.4	2.3	6.4	55.	3.2	7.1
33	2.7	179.3	-1.0	10.75	2.1	2.7	3.54	1.8	1.8	5.9	49.	-1.0	6.9
34	2.6	178.9	-1.1	9.56	2.3	2.6	1.81	2.7	2.4	4.4	58.	2.0	7.3
35	2.7	179.4	-1.1	8.45	2.5	2.7	1.04	2.9	2.6	4.5	61.	6.5	7.5
36	2.7	179.2	-1.1	8.55	2.6	2.7	1.84	3.3	3.1	4.5	56.	-0.8	7.0
37	2.4	178.4	-0.9	15.35	2.4	1.8	0.82	2.2	2.1	3.9	65.	-4.0	4.1
38	2.5	178.6	-0.9	16.30	2.5	1.9	0.53	2.0	1.9	4.0	47.	0.3	4.1
39	2.6	178.9	-0.8	16.95	2.6	2.3	0.76	2.1	2.0	4.1	52.	-0.9	4.3
40	2.5	178.8	-1.2	10.26	2.5	2.2	3.56	2.2	2.2	3.5	52.	-0.4	7.4
41	2.6	179.1	-1.0	16.71	2.6	2.5	3.76	2.1	2.0	6.9	56.	-0.8	7.5
42	3.0	180.1	-1.3	10.81	3.0	2.4	3.58	2.3	2.2	3.5	43.	0.1	8.2
43	1.3	173.3	-0.4	12.81	1.0	1.3	3.04	1.0	0.9	8.6	92.	-0.4	4.6
44	1.3	173.0	-0.5	15.23	1.1	1.3	3.04	0.9	0.9	8.0	57.	0.0	4.2
45	1.3	173.2	-0.6	12.86	1.1	1.3	3.29	0.9	0.9	8.5	51.	-0.1	4.2
46	1.3	172.8	-0.4	12.04	1.1	1.3	1.18	1.0	0.7	7.2	59.	-0.2	4.0
47	1.2	172.3	-0.4	15.16	1.0	1.2	1.24	0.8	0.8	6.2	39.	0.2	3.6
48	1.2	172.5	-0.4	17.04	1.1	1.2	1.23	1.2	1.0	6.2	70.	0.1	3.8

Table 6-10. Gauge 10 - 15 May

M109 TEST 16 MAY 79 ABERDEEN PG

GAUGE 1

SHOT	MAXIMUM PRESSURE PSI	DR	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	0.5	164.4	-0.2	16.49	0.0	0.5	2.95	0.0	0.0	0.0	103.	-0.1	2.2
2	0.5	164.4	-0.1	46.73	0.0	0.5	9.94	0.0	0.0	0.0	71.	0.1	1.7
3	0.5	165.4	-0.6	117.60	0.0	0.5	12.25	0.0	0.0	0.0	69.	-1.0	2.0
4	0.5	164.9	-0.2	46.49	0.0	0.5	11.26	0.0	0.0	0.0	61.	0.0	1.5
5	0.5	164.1	-0.3	47.94	0.0	0.5	22.96	0.0	0.0	0.0	303.	0.7	2.1
6	0.5	165.4	-0.3	49.54	0.0	0.5	23.88	0.0	0.0	0.0	84.	-2.0	2.5
7	0.4	163.4	-0.2	46.73	0.0	0.4	24.21	0.0	0.0	0.0	302.	0.3	1.8
8	2.0	176.7	-1.0	2.00	2.0	1.6	2.03	1.2	1.0	0.6	36.	1.8	0.4
9	2.0	176.8	-1.0	2.01	2.0	1.2	2.03	1.2	0.9	0.6	122.	1.4	0.4
10	1.8	175.9	-1.0	2.00	1.8	1.6	2.03	1.2	1.0	0.7	54.	1.1	0.4
11	0.6	166.0	-0.2	31.13	0.0	0.6	3.00	0.0	0.0	0.0	53.	-0.2	2.3
12	0.6	166.9	-0.2	30.11	0.6	0.5	1.02	0.6	0.6	8.5	54.	-0.3	2.3
13	0.6	165.9	-0.2	43.42	0.0	0.6	13.35	0.0	0.0	0.0	54.	0.5	2.3
14	0.7	167.6	-0.2	32.73	0.7	0.4	0.70	0.6	0.6	10.5	63.	-7.2	1.9
15	0.7	167.9	-0.1	36.33	0.7	0.5	0.70	0.7	0.7	8.2	56.	0.5	1.9
16	0.6	166.6	-0.2	25.52	0.6	0.5	0.73	0.6	0.6	8.5	59.	-0.1	2.0
17	0.7	168.0	-0.2	34.78	0.7	0.5	0.88	0.8	0.8	10.1	55.	0.6	2.8
18	0.7	167.5	-0.2	14.50	0.7	0.5	0.88	0.8	0.7	10.0	60.	-0.6	2.7
19	0.7	167.6	-0.2	33.74	0.7	0.5	1.05	0.8	0.7	10.0	60.	1.3	2.8
20	0.6	165.6	-0.2	29.44	0.0	0.6	3.65	0.0	0.0	0.0	61.	1.2	2.3
21	0.5	164.9	-0.2	43.35	0.0	0.5	14.78	0.0	0.0	0.0	61.	-0.1	2.0
22	0.5	165.4	-0.2	28.50	0.0	0.5	4.40	0.0	0.0	0.0	51.	1.5	2.0
23	0.7	167.3	-0.2	29.40	0.7	0.6	1.10	0.6	0.5	10.2	57.	0.4	2.8
24	0.6	166.0	-0.2	30.81	0.0	0.6	4.43	0.0	0.0	0.0	58.	-0.2	2.6
25	0.7	167.6	-0.2	25.44	0.7	0.6	1.86	0.6	0.5	0.0	52.	0.7	2.0
26	0.6	166.7	-0.2	37.80	0.6	0.6	1.04	0.7	0.6	9.2	56.	0.0	2.7
27	0.6	166.7	-0.1	37.29	0.6	0.6	1.85	0.6	0.5	0.0	58.	0.0	1.9
28	0.6	166.6	-0.2	25.39	0.6	0.6	1.02	0.6	0.6	9.6	58.	0.2	2.6
29	0.7	167.3	-0.2	24.74	0.7	0.6	1.02	0.7	0.6	9.7	53.	-1.2	2.5
30	0.7	167.3	-0.2	26.93	0.7	0.6	1.10	0.8	0.7	10.9	55.	-0.3	2.7
31	0.6	166.3	-0.2	34.53	0.0	0.6	11.86	0.0	0.0	0.0	57.	-0.3	2.3
32	0.7	168.1	-0.2	24.60	0.7	0.6	1.86	0.7	0.7	0.0	47.	-0.3	2.6
33	0.7	167.4	-0.2	26.11	0.7	0.6	1.19	0.7	0.6	0.0	59.	-0.9	2.6
34	0.7	167.6	-0.2	25.93	0.7	0.6	1.61	0.7	0.7	9.3	58.	0.4	2.7
35	0.6	166.2	-0.2	30.26	0.0	0.6	1.93	0.0	0.0	0.0	62.	-0.4	2.7
36	0.7	167.4	-0.2	31.89	0.7	0.6	1.06	0.6	0.5	10.9	62.	-0.3	3.2
37	0.7	167.3	-0.2	31.66	0.7	0.6	1.08	0.6	0.5	10.9	50.	-1.0	3.1
38	0.8	168.4	-0.2	24.93	0.8	0.7	1.04	0.8	0.7	10.8	59.	0.2	3.0
39	0.7	168.1	-0.2	25.39	0.7	0.7	1.09	0.7	0.7	10.9	59.	-0.2	3.0
40	0.7	168.0	-0.2	25.10	0.7	0.7	1.05	0.8	0.7	8.0	60.	-0.4	2.5
41	0.7	167.9	-0.3	21.10	0.7	0.7	1.11	0.6	0.6	10.9	61.	-0.1	3.9
42	0.7	167.4	-0.2	20.73	0.7	0.7	1.06	0.6	0.6	10.9	61.	-0.5	3.5
43	0.7	167.4	-0.2	20.86	0.7	0.7	1.09	0.7	0.7	10.9	59.	-0.3	3.6
44	0.7	168.0	-0.2	34.05	0.7	0.7	1.16	0.8	0.8	0.0	60.	-0.6	2.8
45	0.7	167.1	-0.2	34.11	0.6	0.7	1.20	0.7	0.7	0.0	61.	-0.6	2.8
46	0.7	167.8	-0.2	33.63	0.7	0.7	1.13	0.8	0.7	10.9	60.	-1.0	3.6

GAUGE ON 0 RADIAL FOR SHOTS 1-10 . PROJECTILE NOISE PRESENT .

Table 6-11. Gauge 1 - 16 May

M109 TEST 16 MAY 79 ABERDEEN PG

GAUGE 2

SHOT	MAXIMUM PRESSURE PSI	DA	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	2.1	177.0	-2.31	84.34	0.7	2.11	84.35	0.7	0.7	8.2	95.	-13.1	3.2
2	0.8	168.5	-0.2	47.95	0.6	0.8	1.77	0.7	0.7	0.0	56.	-0.9	2.5
3	0.9	169.6	-0.3	30.38	0.6	0.9	1.58	0.7	0.7	7.8	55.	-1.0	3.2
4	0.7	168.1	-0.2	36.86	0.6	0.7	1.51	0.7	0.6	8.4	69.	-1.3	3.2
5	0.7	167.9	-0.3	25.27	0.7	0.7	1.61	0.7	0.6	9.1	0.	-3.1	2.9
6	0.8	169.0	-0.3	25.23	0.8	0.7	1.36	0.9	0.8	10.5	75.	-1.4	3.1
7	0.8	168.2	-0.3	44.24	0.8	0.7	0.95	0.9	0.8	9.8	67.	1.2	3.2
8	2.1	177.1	-1.1	1.95	2.1	1.2	1.98	1.2	1.1	0.7	84.	-0.7	0.4
9	2.8	179.7		180.88	2.8	1.6	1.96	1.4	1.1	0.7	151.	-5.3	0.4
10	2.1	177.0	-1.2	1.94	2.1	1.8	1.96	1.2	1.1	0.7	83.	-1.9	0.4
11	0.8	169.2	-0.3	31.25	0.6	0.8	1.95	0.7	0.6	8.8	54.	-1.1	3.4
12	0.9	169.3	-0.3	28.64	0.9	0.8	0.89	0.8	0.8	7.5	54.	-1.1	2.8
13	0.9	169.3	-0.3	32.19	0.6	0.9	1.68	0.7	0.6	8.7	54.	-1.7	3.5
14	1.0	170.8	-0.3	35.29	1.0	0.9	2.19	0.8	0.8	12.0	55.	-1.0	3.9
15	0.9	169.6	-0.2	36.54	0.9	0.8	2.06	0.8	0.7	8.2	59.	-1.4	3.3
16	0.9	169.7	-0.2	27.69	0.9	0.8	2.20	0.8	0.7	9.0	67.	-2.0	3.2
17	0.8	169.1	-0.3	34.88	0.8	0.8	0.99	0.9	0.9	9.4	60.	-1.0	3.9
18	0.8	169.1	-0.2	39.05	0.8	0.8	1.63	0.9	0.9	9.4	84.	-2.9	3.7
19	0.8	169.1	-0.3	35.66	0.8	0.7	1.51	1.0	0.9	9.0	67.	-2.7	3.8
20	0.8	168.2	-0.3	25.93	0.6	0.8	1.91	0.6	0.6	10.9	62.	-1.7	4.1
21	0.8	168.4	-0.3	28.63	0.7	0.8	1.60	0.7	0.7	9.8	61.	-1.4	4.2
22	0.8	168.5	-0.4	29.63	0.6	0.8	1.65	0.8	0.7	0.0	61.	-1.8	3.5
23	1.0	170.7	-0.3	30.81	1.0	0.9	1.09	1.1	1.1	8.9	58.	-1.4	4.2
24	1.0	170.4	-0.3	27.89	1.0	0.9	1.10	1.1	1.1	8.9	58.	-0.6	4.1
25	1.0	170.9	-0.3	28.26	1.0	0.9	1.05	1.2	1.1	8.9	55.	-1.3	4.2
26	1.0	170.9	-0.3	37.55	1.0	0.9	0.84	1.1	1.0	8.8	55.	-1.5	4.2
27	1.0	171.0	-0.2	28.11	1.0	0.9	0.80	1.1	1.0	8.7	56.	-1.6	4.0
28	1.0	171.1	-0.2	25.00	1.0	0.9	0.82	0.9	0.8	8.8	55.	-1.5	4.1
29	1.1	171.7	-0.4	26.10	0.8	1.1	2.40	0.9	0.8	12.2	55.	-1.6	4.9
30	1.1	171.3	-0.3	26.13	0.8	1.1	2.41	0.6	0.6	12.0	56.	-1.7	4.8
31	1.0	170.7	-0.3	23.19	0.8	1.0	2.38	0.9	0.7	10.8	56.	-1.5	4.4
32	1.0	170.7	-0.3	23.93	1.0	1.0	1.74	1.1	0.9	11.5	58.	-2.0	5.3
33	1.0	170.9	-0.3	25.29	1.0	1.0	1.69	0.9	0.8	11.5	56.	-1.4	5.0
34	1.0	170.5	-0.2	25.59	0.9	1.0	1.69	1.1	1.0	9.0	59.	-1.9	4.1
35	1.0	170.6	-0.3	30.13	1.0	0.9	1.61	1.1	1.0	11.4	64.	-1.6	4.5
36	1.0	170.9	-0.3	26.05	1.0	1.0	1.60	1.2	1.1	11.4	63.	-1.4	5.0
37	1.0	170.5	-0.3	29.44	1.0	1.0	1.55	1.1	1.0	11.4	65.	-1.3	4.9
38	1.1	171.3	-0.3	24.88	0.8	1.1	2.06	0.7	0.6	11.9	59.	-2.1	5.1
39	1.0	170.9	-0.3	24.95	0.9	1.0	1.96	0.8	0.7	11.8	60.	-1.5	5.4
40	1.0	170.9	-0.3	25.85	0.8	1.0	2.00	0.9	0.8	11.2	60.	-1.7	4.8
41	1.0	171.2	-0.3	20.29	1.0	0.9	1.73	1.3	1.1	11.5	57.	-2.0	5.9
42	1.1	171.3	-0.3	21.29	1.1	0.9	1.10	1.2	1.1	10.9	56.	-1.9	5.2
43	1.0	171.1	-0.3	20.16	1.0	0.9	1.66	1.1	1.1	11.5	56.	-2.2	5.4
44	1.1	171.3	-0.3	39.19	1.1	0.9	1.10	1.2	1.1	10.9	58.	-1.8	4.9
45	1.0	171.0	-0.2	25.16	1.0	0.9	1.10	0.9	0.8	10.9	59.	-1.5	4.9
46	1.1	171.4	-0.3	32.73	1.1	0.9	1.08	1.2	1.1	10.9	58.	-1.7	5.4

GAUGE ON 0
RADIAL FOR SHOTS
1-10 . PROJECTILE
NOISE PRESENT .

Table 6-12. Gauge 2 - 16 May

M109 TEST 16 MAY 79 ABERDEEN PG

GAUGE 3

SHOT	MAXIMUM PRESSURE PSI	DR	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	1.0	170.5	-3.3	167.11	0.9	1.0	2.19	0.9	0.9	7.8	0.	6.8	3.8
2	0.9	169.9	-0.2	12.98	0.9	0.9	2.09	1.0	0.9	7.8	69.	1.5	3.7
3	0.9	170.3	-0.3	29.40	0.9	0.9	2.30	1.0	0.9	7.6	68.	0.2	3.7
4	0.9	169.9	-0.3	28.45	0.9	0.9	2.24	1.1	1.0	0.1	68.	-1.2	2.6
5	1.0	171.2	-0.5	25.15	0.9	1.0	2.16	0.7	0.7	8.1	170.	-1.6	3.8
6	1.1	171.9	-0.5	24.79	1.0	1.1	1.18	0.9	0.8	9.9	68.	1.9	4.2
7	1.1	171.6	-0.4	23.04	1.1	1.1	1.52	0.9	0.9	10.4	69.	0.6	4.3
8	1.2	172.1	-0.5	-14.91	1.2	1.0	1.08	1.1	1.0	8.6	84.	-1.4	4.3
9	2.5	178.6	-1.1	1.74	2.5	1.9	1.88	1.1	1.0	0.2	75.	3.7	0.2
10	2.0	176.5	-1.1	1.85	2.0	1.6	1.88	1.3	1.1	0.2	130.	0.3	0.2
11	1.0	170.7	-0.4	30.71	0.9	1.0	2.20	0.9	0.8	9.1	72.	0.9	4.1
12	0.9	170.1	-0.3	31.24	0.8	0.9	2.17	0.7	0.7	8.9	72.	0.4	4.0
13	1.0	170.7	-0.3	30.44	0.8	1.0	2.11	0.8	0.8	9.1	62.	-0.7	4.2
14	1.3	173.0	-0.3	34.09	1.0	1.3	1.52	1.1	1.0	9.1	54.	0.5	4.4
15	1.2	172.1	-0.3	37.01	1.0	1.2	1.55	1.0	0.9	8.7	55.	2.3	4.2
16	1.2	172.1	-0.3	41.65	1.0	1.2	1.64	0.9	0.9	8.9	63.	-0.1	4.1
17	1.2	172.2	-0.4	31.91	1.2	1.1	1.01	1.3	1.2	9.3	69.	-4.1	4.6
18	1.3	173.1	-0.3	19.58	1.3	1.0	1.01	1.4	1.3	9.1	63.	-1.3	4.7
19	1.3	173.1	-0.3	20.96	1.3	1.1	1.01	1.4	1.3	8.9	58.	2.0	4.9
20	1.3	173.0	-0.4	27.80	1.1	1.3	2.06	0.9	0.9	9.3	59.	0.6	4.8
21	1.3	173.0	-0.4	28.44	1.0	1.3	2.11	0.9	0.9	9.5	49.	1.8	4.9
22	1.3	173.2	-0.4	27.56	1.0	1.3	2.13	0.9	0.8	12.1	49.	-0.3	5.0
23	1.5	174.2	-0.4	28.61	1.1	1.5	1.20	1.1	1.0	8.1	52.	-1.5	5.1
24	1.4	173.7	-0.4	27.61	1.1	1.4	1.31	0.9	0.9	7.9	58.	0.9	4.9
25	1.5	174.3	-0.4	29.27	1.1	1.5	1.18	1.0	0.9	8.0	51.	0.9	5.0
26	1.8	175.8	-0.3	36.74	1.8	1.5	1.05	2.0	1.8	7.8	48.	-1.6	5.2
27	1.9	176.1	-0.3	30.30	1.9	1.5	1.02	2.1	2.0	7.3	42.	-1.6	5.1
28	1.9	176.3	-0.4	29.74	1.9	1.5	1.04	2.2	2.0	6.9	42.	-1.0	5.2
29	1.8	175.6	-0.5	25.99	1.4	1.8	2.25	1.4	1.3	12.2	45.	-0.7	6.9
30	1.6	174.7	-0.4	24.95	1.4	1.6	2.29	1.4	1.2	11.9	54.	-0.2	6.7
31	1.7	175.3	-0.5	20.59	1.4	1.7	2.19	1.3	1.2	10.7	52.	-2.2	6.4
32	2.2	177.6	-0.4	23.66	2.2	1.4	1.71	3.0	2.9	11.5	37.	-0.4	7.5
33	2.1	177.2	-0.5	24.05	2.1	1.4	1.64	2.7	2.5	11.4	46.	-0.5	7.2
34	2.1	177.1	-0.4	25.90	2.1	1.4	1.69	2.5	2.4	9.2	50.	0.3	6.2
35	2.4	178.4	-0.4	29.70	2.4	1.6	0.90	2.2	1.9	10.7	34.	0.7	6.8
36	2.6	178.9	-0.4	23.83	2.6	1.7	1.04	2.3	2.0	10.5	36.	-1.1	7.5
37	2.6	179.1	-0.4	24.27	2.6	1.6	0.86	2.5	2.4	10.7	35.	0.6	7.5
38	2.1	177.1	-0.5	24.79	1.6	2.1	2.63	1.5	1.4	12.6	49.	-1.3	9.6
39	2.1	177.0	-0.6	25.41	1.7	2.1	2.60	1.7	1.6	12.4	49.	-0.4	8.8
40	2.0	176.8	-0.5	24.80	1.5	2.0	2.61	1.5	1.5	8.6	44.	-1.3	6.8
41	2.3	177.9	-0.6	19.15	2.0	2.3	1.02	3.0	2.7	11.0	47.	-1.0	9.4
42	2.3	178.1	-0.5	20.58	2.1	2.3	1.01	3.3	3.0	10.9	43.	1.3	8.6
43	2.3	177.9	-0.5	18.99	2.0	2.3	1.05	2.9	2.7	10.9	46.	-0.3	8.8
44	2.8	179.6	-0.4	30.85	2.8	2.1	1.01	2.9	2.7	10.8	42.	-1.7	8.2
45	2.8	179.8	-0.5	23.93	2.8	2.1	1.01	2.7	2.6	10.8	40.	0.9	8.3
46	2.9	180.0	-0.5	13.75	2.9	2.2	1.02	2.8	2.6	10.8	44.	-0.4	9.2

GAUGE ON 0 RADIAL FOR SHOTS 1-10 , PROJECTILE NOISE PRESENT .

Table 6-13. Gauge 3 - 16 May

M109 TEST 16 MAY 79 ABERDEEN PG

GAUGE 4

SHOT	MAXIMUM PRESSURE PSI	DR	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-MS	POS IMP	
1	1.8	175.8	-0.6	13.51	1.8	1.8	3.43	1.6	1.5	7.8	221.	0.1	6.5	GAUGE ON 0
2	1.7	175.5	-0.4	15.59	1.7	1.7	3.42	1.7	1.6	7.9	55.	-1.2	6.6	RADIAL FOR SHOTS
3	1.9	176.2	-0.5	27.27	1.8	1.9	3.41	1.6	1.5	10.0	52.	-1.4	6.9	1-10 , PROJECTILE
4	1.7	175.5	-0.5	39.70	1.7	1.7	3.42	1.5	1.5	8.9	56.	-0.8	6.8	NOISE PRESENT .
5	2.2	177.5	-0.8	23.50	1.9	2.2	3.17	1.8	1.7	7.7	64.	-0.2	7.6	
6	2.4	178.5	-0.8	23.77	1.9	2.4	3.24	1.7	1.7	10.0	53.	-0.1	8.3	
7	1.8	175.8	-0.7	23.08	1.8	1.8	3.19	1.7	1.6	10.1	64.	0.2	8.2	
8	4.7	184.1	-1.6	1.75	4.7	1.5	10.24	2.5	2.0	0.6	70.	21.6	10.1	
9	3.8	182.4	-1.6	1.76	3.8	2.3	1.79	2.1	1.8	0.6	59.	1.8	0.5	
10	4.9	184.6	-1.6	1.76	4.9	2.3	1.79	2.4	1.9	0.6	98.	45.0	0.5	
11	1.7	175.5	-0.5	29.65	1.6	1.7	3.71	1.4	1.4	9.2	53.	0.6	7.1	
12	1.8	175.8	-0.5	32.91	1.5	1.8	3.74	1.5	1.2	9.0	53.	-1.4	7.0	
13	1.8	175.8	-0.6	30.24	1.5	1.8	3.69	1.4	1.3	9.7	50.	-0.9	7.4	
14	2.8	179.8	-0.6	20.84	2.4	2.8	3.01	2.1	2.0	8.6	49.	-0.4	8.6	
15	2.4	178.4	-0.5	37.24	2.1	2.4	3.05	2.0	1.9	7.6	52.	1.4	8.0	
16	2.4	178.3	-0.6	41.92	2.2	2.4	3.06	2.0	2.0	8.4	52.	-0.9	7.9	
17	2.9	179.9	-0.7	33.26	0.6	2.9	2.13	0.5	0.5	1.0	54.	-0.1	8.4	
18	3.4	181.4	-0.8	22.71	0.6	3.4	2.19	0.5	0.5	1.0	52.	0.8	8.4	
19	3.0	180.3	-0.8	20.46	0.6	3.0	2.19	0.5	0.5	0.8	51.	-1.9	8.9	
20	1.9	176.2	-0.6	25.04	1.9	1.9	4.08	1.6	1.5	11.2	50.	-1.6	8.7	
21	1.9	176.4	-0.6	26.16	1.9	1.8	4.08	1.7	1.6	11.4	56.	-0.9	8.7	
22	1.9	176.5	-0.6	27.30	1.9	1.9	4.08	1.7	1.6	12.1	50.	-2.5	9.3	
23	2.5	178.6	-0.7	27.70	2.5	2.5	3.19	2.3	2.2	8.7	56.	1.0	9.9	
24	2.6	179.1	-0.6	30.81	2.5	2.6	3.06	2.2	2.1	8.9	55.	1.4	9.6	
25	2.5	178.6	-0.7	28.05	2.5	2.5	2.96	2.4	2.3	9.8	53.	-0.2	9.9	
26	3.2	180.9	-0.7	34.66	3.2	3.0	1.41	3.7	3.4	8.6	46.	0.9	10.7	
27	3.4	181.3	-0.6	32.80	3.4	3.0	0.93	3.5	3.3	6.4	49.	0.0	10.3	
28	3.8	182.3	-0.8	30.59	3.8	3.2	0.91	4.0	3.9	6.3	41.	1.5	10.4	
29	2.6	179.0	-0.9	23.20	2.6	2.6	4.97	2.4	2.4	13.9	45.	0.7	13.2	
30	2.5	178.8	-0.7	22.74	2.5	2.5	4.86	2.2	2.1	10.9	56.	1.4	11.5	
31	2.7	179.3	-0.7	22.50	2.5	2.7	4.95	2.3	2.3	12.0	45.	1.0	11.6	
32	3.3	181.1	-0.7	24.59	3.3	2.8	3.51	3.0	3.0	12.0	45.	1.3	15.2	
33	3.5	181.5	-0.7	18.71	3.5	3.2	3.58	3.0	2.9	9.9	47.	2.6	13.5	
34	3.1	180.7	-0.7	26.61	3.1	2.8	3.53	2.8	2.7	9.0	52.	0.3	12.1	
35	4.2	183.3	-0.8	25.14	4.2	3.3	1.75	5.7	5.4	10.6	36.	2.1	14.3	
36	5.0	184.7	-0.9	22.43	5.0	3.7	1.10	5.5	5.3	10.5	36.	-0.9	15.9	
37	4.4	183.7	-0.8	22.81	4.4	4.2	1.15	4.5	4.1	11.0	42.	3.3	15.5	
38	3.5	181.7	-0.9	21.58	3.3	3.5	5.72	2.9	2.8	14.8	137.	89.5	16.6	SEVERE TRANSDUCER DRIFT
39	3.6	181.9	-0.9	27.05	3.3	3.6	5.68	3.1	3.0	15.2	60.	9.0	17.4	STARTING AT SHOT 38 .
40	3.4	181.4	-0.7	27.14	3.4	3.1	5.72	3.0	2.9	5.6	147.	104.1	16.1	DATA FOR SHOTS 38-46
41	3.8	182.4	-0.9	19.95	3.8	3.1	4.15	3.2	3.1	12.3	165.	62.9	19.0	IS QUESTIONABLE .
42	3.8	182.2	-0.9	19.50	3.8	2.8	3.70	3.1	3.0	13.7	135.	60.4	18.1	
43	3.8	182.2	-0.8	20.13	3.8	3.3	4.19	3.1	3.0	12.7	160.	113.6	18.1	
44	4.4	183.7	-0.9	24.93	4.4	3.9	1.77	4.6	4.3	7.2	145.	104.9	14.4	
45	4.3	183.5	-0.8	22.88	4.2	4.3	1.59	4.5	4.3	11.5	185.	186.1	17.8	
46	4.7	184.1	-0.9	27.46	4.7	4.0	1.44	5.3	4.9	11.3	143.	112.4	18.4	

Table 6-14. Gauge 4 - 16 May

M109 TEST 16 MAY 79 ABERDEEN PG

GAUGE 5

SHOT	MAXIMUM PRESSURE PSI	DB	MIN PST	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	1.1	171.9	-1.2	33.20	0.8	1.1	3.14	0.0	0.7	8.6	154.	-4.6	4.5
2	0.4	163.6	-0.4	67.65	0.0	0.4	13.04	0.0	0.0	0.2	0.	-6.2	0.6
3	0.5	164.9	-0.4	74.58	0.0	0.5	35.11	0.0	0.0	0.3	301.	-1.3	0.5
4	0.5	164.7	-0.4	75.47	0.1	0.5	26.94	0.0	0.1	0.7	169.	-5.8	0.4
5	0.5	165.4	-0.5	67.70	0.0	0.5	17.33	0.0	0.0	0.2	200.	-6.7	0.2
6	0.0	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0	0.	0.0	0.0
7	0.5	164.5	-0.5	72.26	0.0	0.5	30.81	0.0	0.0	0.2	0.	-10.7	0.5
8	0.6	165.6	-0.4	72.55	0.0	0.6	17.30	0.0	-0.1	0.2	311.	-10.1	0.3
9	0.5	165.4	-0.5	55.25	0.1	0.5	13.98	0.0	0.1	0.9	311.	-7.2	0.2
10	0.9	169.8	-0.7	56.01	0.9	0.7	2.21	0.0	1.0	1.7	147.	-3.6	1.8
11	1.3	172.9	-1.6	50.17	0.6	1.3	23.30	0.0	0.6	0.7	193.	-4.9	2.6
12	1.2	172.6	-1.5	54.17	0.6	1.2	16.85	0.0	0.8	0.8	310.	-5.1	6.6
13	1.2	172.5	-1.4	55.00	0.6	1.2	18.69	0.0	0.8	0.7	230.	-5.0	4.3
14	1.3	172.7	-1.2	52.25	0.7	1.3	19.08	0.0	0.9	0.9	215.	-5.9	3.1
15	1.1	171.8	-1.2	49.90	0.6	1.1	19.85	0.0	0.8	0.8	206.	-6.2	2.0
16	1.2	172.4	-1.2	53.98	0.7	1.2	20.20	0.0	0.8	0.0	233.	-5.6	1.3
17	1.2	172.5	-1.4	45.81	0.6	1.2	10.43	0.0	0.7	0.9	210.	-6.9	2.6
18	1.0	170.4	-1.5	45.34	0.6	1.0	9.41	0.0	0.7	0.8	212.	-7.6	3.1
19	1.2	172.3	-1.4	45.48	0.6	1.2	11.71	0.0	0.7	0.9	208.	-6.5	2.6
20	1.6	175.0	-1.2	52.91	1.0	1.6	12.74	0.0	1.0	3.1	145.	-9.4	3.6
21	1.5	174.3	-1.2	48.33	1.0	1.5	12.46	0.0	1.2	3.1	219.	2.9	7.2
22	1.5	174.1	-1.4	47.44	1.1	1.5	12.54	0.0	1.3	3.2	236.	-7.7	3.8
23	1.7	175.5	-1.4	49.34	0.8	1.7	1.86	0.0	1.1	0.8	210.	-8.0	1.9
24	1.5	174.4	-1.4	48.80	0.7	1.5	2.09	0.0	0.7	1.0	207.	-6.5	2.2
25	1.7	175.5	-1.3	46.76	0.7	1.7	1.71	0.0	0.8	0.6	204.	-8.9	1.9
26	1.3	172.8	-1.4	47.75	0.6	1.3	1.80	0.0	0.7	11.6	237.	-9.3	5.8
27	1.3	173.2	-1.2	45.61	1.1	1.3	4.16	0.0	2.0	14.0	230.	-7.1	8.1
28	1.3	173.3	-1.4	46.73	1.2	1.3	15.35	0.0	1.9	9.2	234.	-10.1	7.8
29	1.4	173.6	-2.3	0.57	0.6	1.4	7.56	0.0	0.6	0.0	199.	-7.9	2.3
30	1.5	174.5	-2.4	-3.34	0.7	1.5	5.90	0.0	0.5	0.0	221.	-8.8	1.3
31	1.5	174.1	-2.4	-4.43	1.5	1.5	6.76	1.9	1.8	0.0	239.	-9.5	1.4
32	2.0	176.6	-1.7	7.01	2.0	2.0	2.59	0.0	2.3	5.7	198.	-7.9	5.4
33	2.0	176.9	-1.7	8.69	2.0	2.0	2.70	0.0	2.6	0.0	200.	-3.2	2.3
34	2.0	176.8	-1.8	8.11	2.0	1.9	2.58	0.0	2.3	5.5	140.	-6.0	5.2
35	1.7	175.2	-1.3	37.28	1.5	1.7	1.94	0.0	2.2	9.7	219.	-6.3	7.5
36	1.7	175.6	-1.4	46.06	1.3	1.7	1.98	0.0	1.9	0.0	154.	-11.9	5.2
37	1.7	175.2	-1.4	46.08	1.7	1.6	1.94	0.0	2.5	0.0	192.	-9.1	4.7
38	0.8	169.2	-0.2	27.21	0.8	0.7	1.02	0.0	0.9	7.9	52.	-1.1	3.2
39	0.8	169.1	-0.3	28.09	0.8	0.8	0.98	0.0	0.8	9.2	53.	-0.7	3.3
40	0.9	169.5	-0.2	37.14	0.9	0.8	1.02	0.0	0.9	8.3	54.	-0.7	3.2
41	0.9	170.2	-0.2	18.01	0.9	0.8	0.57	0.0	0.8	10.4	52.	-0.7	3.6
42	0.9	170.3	-0.2	27.84	0.9	0.7	0.57	0.0	0.8	10.4	52.	-0.6	3.1
43	0.9	169.8	-0.2	30.76	0.9	0.7	0.94	0.0	0.8	10.0	53.	-0.7	3.3
44	0.8	169.1	-0.2	32.13	0.8	0.7	0.53	0.0	0.7	9.0	53.	0.1	3.3
45	0.9	169.8	-0.2	30.30	0.9	0.7	0.54	0.0	0.8	8.3	54.	-0.3	3.3
46	0.9	169.5	-0.2	29.63	0.9	0.7	0.94	0.0	0.8	10.3	51.	-0.1	3.6

NOTE : THE GAUGE WAS INSIDE M109 FOR SHOTS 1-37 . THE RESULTING RECORDS DO NOT FOLLOW THE CLASSICAL PATTERN , SO THE PARAMETERS MAY NOT HAVE MEANING . THE RESULTS ARE INCLUDED FOR A SHOT TO SHOT COMPARISON .

Table 6-15. Gauge 5 - 16 May

M109 TEST 16 MAY 79 ABERDEEN PG

GAUGE 6

SHOT	MAXIMUM PRESSURE PSI	DB	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	1.5	174.0	-1.3	33.38	0.9	1.5	14.06	0.0	1.1	4.8	118.	-9.0	3.7
2	0.7	167.4	-0.8	21.46	0.7	0.7	9.43	0.0	0.7	1.0	311.	-1.6	0.9
3	0.8	168.9	-0.5	35.23	0.8	0.8	7.43	0.0	0.9	1.9	174.	-2.7	1.6
4	0.7	167.5	-0.5	-19.77	0.7	0.6	10.21	0.0	0.6	1.2	222.	-6.8	0.8
5	0.7	167.5	-0.5	35.11	0.7	0.7	2.58	0.0	0.8	1.3	208.	-4.3	0.9
6	0.0	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0	0.	0.0	0.0
7	0.7	167.8	-0.6	54.28	0.6	0.7	3.29	0.0	0.7	0.8	307.	-5.8	0.7
8	0.8	168.5	-0.6	49.06	0.8	0.5	5.81	0.0	0.8	1.2	176.	-12.9	1.4
9	0.7	167.5	-0.7	48.33	0.7	0.5	2.20	0.0	1.0	1.0	347.	-10.4	0.8
10	0.9	170.2	-0.6	51.84	0.7	0.9	2.94	0.0	0.8	7.0	161.	-6.0	3.0
11	1.5	174.3	-1.3	58.56	0.8	1.5	17.48	1.2	1.0	0.8	225.	14.6	8.7
12	1.3	173.1	-1.4	58.10	0.8	1.3	22.94	1.2	1.0	0.9	0.	13.8	3.7
13	1.4	173.4	-1.5	57.90	0.6	1.4	17.36	0.0	0.7	0.7	208.	-10.5	8.0
14	1.4	173.5	-1.2	54.48	0.6	1.4	21.02	0.0	0.9	0.6	179.	-3.8	3.3
15	1.4	173.4	-1.0	50.06	0.6	1.4	21.52	0.0	0.6	0.5	0.	21.0	2.7
16	1.4	173.9	-1.0	64.49	0.7	1.4	18.14	0.8	0.8	0.5	309.	17.2	5.8
17	1.3	172.8	-1.3	61.30	0.8	1.3	15.36	0.0	1.4	0.9	221.	-8.3	4.0
18	1.2	172.0	-1.3	58.65	0.9	1.2	18.65	0.0	1.5	0.0	217.	-2.5	3.9
19	1.3	172.7	-1.2	60.28	0.7	1.3	17.24	0.0	1.0	0.6	309.	-6.5	3.4
20	1.6	174.9	-1.4	40.76	1.4	1.6	2.58	0.0	2.0	0.0	311.	0.6	2.7
21	1.5	174.0	-1.2	50.81	1.4	1.5	2.45	0.0	1.9	1.2	220.	0.4	3.0
22	1.5	174.1	-1.1	43.40	1.3	1.5	2.64	0.0	2.0	1.3	312.	4.8	4.0
23	1.4	173.7	-1.4	52.33	0.7	1.4	17.45	0.0	0.9	0.6	216.	-4.8	1.7
24	1.4	173.5	-1.4	50.17	0.8	1.4	14.94	0.0	0.9	0.7	215.	-0.2	1.1
25	1.6	174.8	-1.5	49.60	0.8	1.6	15.01	0.0	1.1	0.7	308.	29.3	1.4
26	1.6	174.8	-1.3	43.09	1.0	1.6	5.50	0.0	1.2	10.1	204.	1.9	7.1
27	1.6	174.9	-1.3	43.35	1.2	1.6	5.54	0.0	1.5	1.1	141.	-3.5	2.2
28	1.6	174.9	-1.2	45.89	1.0	1.6	14.66	0.0	1.5	1.2	178.	-1.2	4.2
29	2.3	178.1	-1.8	32.76	2.0	2.3	2.95	0.0	2.5	0.0	146.	2.8	4.9
30	2.4	178.3	-1.5	41.13	1.8	2.4	2.73	0.0	2.2	5.0	142.	-0.4	5.5
31	2.4	178.5	-1.5	32.86	1.9	2.4	2.67	0.0	2.3	0.0	136.	2.8	5.2
32	1.8	175.9	-1.4	33.64	0.7	1.8	8.46	0.0	0.8	0.7	245.	1.7	2.3
33	1.9	176.2	-1.3	41.64	0.8	1.9	15.25	0.0	1.0	0.6	150.	-4.7	1.3
34	1.8	175.9	-1.4	41.56	0.7	1.8	2.83	0.0	0.7	0.6	213.	-2.7	4.4
35	1.8	175.7	-1.3	45.65	1.1	1.8	9.29	0.0	1.2	1.2	215.	-0.8	1.8
36	1.7	175.4	-1.3	45.66	1.1	1.7	16.01	0.0	1.4	1.1	213.	-0.4	2.5
37	1.9	176.1	-1.3	37.41	1.1	1.9	15.04	0.0	1.7	1.1	169.	0.6	3.9
38	1.5	174.3	-0.3	26.69	0.8	1.5	1.75	0.0	0.6	9.3	50.	0.2	4.7
39	1.5	174.4	-0.3	30.19	0.8	1.5	1.73	0.0	0.6	9.6	53.	1.3	4.9
40	1.5	174.3	-0.3	36.46	0.8	1.5	1.77	0.0	0.6	8.9	52.	-0.5	4.7
41	1.5	174.3	-0.3	18.45	1.5	1.2	0.88	0.0	1.3	9.7	51.	-0.6	4.9
42	1.3	172.9	-0.3	31.95	1.3	1.1	0.78	0.0	1.2	10.6	52.	0.0	4.4
43	1.2	172.5	-0.3	30.50	1.2	1.1	0.85	0.0	1.1	9.3	53.	-0.8	4.6
44	1.3	173.3	-0.3	31.71	1.3	1.1	0.84	0.0	1.2	8.0	52.	0.5	4.4
45	1.3	173.3	-0.3	29.58	1.3	1.1	0.85	0.0	1.1	8.0	53.	-0.3	4.3
46	1.4	173.6	-0.3	29.48	1.4	1.1	0.84	0.0	1.2	9.4	50.	-0.8	4.7

NOTE : THE GAUGE WAS INSIDE M109 FOR SHOTS 1-37 . THE RESULTING RECORDS DO NOT FOLLOW THE CLASSICAL PATTERN , SO THE PARAMETERS MAY NOT HAVE MEANING . THE RESULTS ARE INCLUDED FOR A SHOT TO SHOT COMPARISON .

Table 6-16. Gauge 6 - 16 May

M109 TEST 16 MAY 79 ABERDEEN PG

GAUGE 7

SHOT	MAXIMUM PRESSURE PSI	DB	MIN PST	TIME MIN MS	INIT MAX PSI	REFL MAX PST	TIME REFL MS	EST MAX PSI	AVE EST PST	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS	
1	1.5	174.6	-1.5	22.74	1.5	1.2	1.91	0.0	1.1	0.3	124.	-33.0	0.6	
2	0.6	166.9	-0.4	34.92	0.6	0.6	1.69	0.0	0.6	2.7	311.	-3.4	0.9	
3	0.7	168.0	-0.6	34.60	0.7	0.6	2.92	0.0	0.6	1.5	301.	-2.6	2.5	
4	0.7	167.1	-0.5	38.09	0.6	0.7	2.10	0.0	0.6	9.4	311.	-2.7	2.7	
5	0.7	168.0	-0.5	32.05	0.7	0.6	3.08	0.0	0.9	4.0	169.	-2.9	1.6	
6	0.7	168.0	-0.7	25.36	0.7	0.7	3.00	0.0	0.9	5.4	0.	-4.1	1.9	
7	0.6	165.9	-0.5	58.92	0.0	0.6	21.59	0.0	0.0	0.2	310.	1.2	0.8	
8	0.6	165.6	-0.5	64.70	0.0	0.6	16.19	0.0	0.0	0.3	309.	1.2	2.3	
9	0.6	165.6	-0.4	60.67	0.0	0.6	9.88	0.0	0.0	0.2	246.	-2.6	2.7	
10	1.0	170.7	-0.8	46.06	0.9	1.0	1.59	0.0	0.9	11.4	141.	-3.9	4.9	
11	1.1	171.2	-1.1	48.04	0.7	1.0	6.06	0.0	0.8	15.9	197.	3.0	10.2	
12	1.2	172.4	-1.1	57.20	0.8	1.2	14.88	0.8	0.6	0.9	309.	10.6	7.7	
13	1.2	172.3	-1.1	56.25	0.6	1.2	14.84	0.0	0.6	0.9	309.	14.4	9.1	
14	1.1	171.4	-1.2	41.34	0.9	1.1	2.23	0.0	1.2	10.2	236.	-9.3	6.9	
15	1.1	171.3	-1.1	39.06	0.7	1.1	2.30	0.0	0.7	10.6	306.	3.0	6.7	
16	1.0	170.8	-1.1	41.78	0.8	1.0	1.81	0.0	0.7	9.3	225.	-7.1	6.0	
17	0.9	169.9	-1.3	41.15	0.6	0.9	17.15	0.0	0.6	14.0	311.	-7.2	9.3	
18	0.9	170.3	-1.2	46.19	0.6	0.9	9.96	0.0	0.3	19.0	0.	7.7	9.2	
19	0.9	170.2	-1.3	46.41	0.6	0.9	11.65	0.0	0.3	21.5	0.	5.2	10.1	
20	1.5	174.4	-1.3	42.79	1.4	1.5	12.41	0.0	1.6	4.0	129.	-8.9	8.1	
21	1.5	174.0	-1.2	42.90	1.3	1.5	12.48	0.0	1.7	6.4	301.	4.4	10.1	
22	1.5	174.0	-1.2	43.24	1.3	1.5	15.45	0.0	1.5	6.5	0.	10.6	8.0	
23	1.6	174.7	-1.1	51.30	0.9	1.6	5.59	0.0	0.8	6.7	197.	0.2	4.5	
24	1.4	173.8	-1.1	51.34	0.9	1.4	5.56	0.0	0.8	6.6	153.	2.2	4.3	
25	1.4	173.7	-1.1	51.35	0.9	1.4	5.05	0.0	0.9	6.7	182.	3.5	4.4	
26	1.8	175.6	-1.4	46.92	1.0	1.8	4.71	0.0	1.0	14.5	116.	-0.1	10.1	
27	1.6	175.1	-1.3	46.20	1.0	1.6	4.88	0.0	0.9	14.7	129.	4.4	9.8	
28	1.8	175.7	-1.4	46.92	1.0	1.8	4.75	0.0	1.0	14.8	160.	2.2	10.1	
29	1.8	175.7	-1.5	28.30	1.8	1.8	3.54	0.0	2.5	0.0	312.	-89.3	2.3	SHOTS 29-31
30	1.9	176.2	-1.6	-0.64	1.7	1.9	5.97	0.0	1.1	0.3	312.	-67.7	2.8	QUESTIONABLE.
31	2.2	177.5	-1.4	22.27	0.9	2.2	6.96	0.0	0.8	0.2	232.	-77.1	1.4	
32	4.5	184.0	-1.2	42.90	4.6	2.7	6.25	0.0	3.1	5.6	58.	-9.3	5.9	
33	4.5	184.0	-1.1	42.89	4.6	2.8	6.22	0.0	3.0	6.1	58.	-16.0	5.9	
34	4.5	184.0	-1.1	7.54	4.6	2.0	6.22	0.0	3.0	6.1	58.	-16.7	6.0	
35	3.1	180.7	-1.3	32.54	2.4	3.1	4.86	2.6	2.5	10.3	53.	-0.6	9.2	
36	3.1	180.6	-1.3	46.28	2.3	3.1	4.88	2.7	2.6	10.2	56.	-0.3	9.2	
37	3.0	180.3	-1.3	32.55	2.3	3.0	4.86	2.6	2.5	9.8	53.	0.3	9.0	
38	1.6	174.8	-0.4	28.40	1.2	1.6	3.36	0.0	1.1	9.0	54.	-3.8	6.9	
39	1.8	175.7	-0.5	24.52	1.2	1.8	3.41	0.0	1.1	9.7	53.	-2.5	7.4	
40	1.6	174.6	-0.5	35.46	1.3	1.6	4.14	1.2	1.2	9.5	55.	-2.9	7.0	
41	1.8	176.0	-0.5	18.43	1.3	1.8	1.15	0.0	1.2	11.1	52.	-3.9	7.3	
42	1.5	174.6	-0.4	31.96	1.3	1.5	1.20	0.0	1.1	11.2	52.	-1.5	6.6	
43	1.5	174.6	-0.4	34.30	1.2	1.5	1.33	0.0	1.1	9.0	53.	-3.7	6.6	
44	1.9	176.2	-0.5	32.73	1.9	1.6	0.59	0.0	1.6	7.4	53.	-1.6	6.2	
45	1.9	176.1	-0.4	32.78	1.9	1.7	0.60	0.0	1.7	7.3	54.	-1.1	6.1	
46	1.9	176.4	-0.4	31.05	1.9	1.7	0.69	0.0	1.7	8.3	50.	-1.7	6.8	

NOTE : THE GAUGE WAS INSIDE M109 FOR SHOTS 1-17 . THE RESULTING RECORDS DO NOT FOLLOW THE CLASSICAL PATTERN , SO THE PARAMETERS MAY NOT HAVE MEANING . THE RESULTS ARE INCLUDED FOR A SHOT TO SHOT COMPARISON .

Table 6-17. Gauge 7 - 16 May

M109 TEST 16 MAY 79 ABERDEEN PG

GAUGE 8

SHOT	MAXIMUM PRESSURE PSI	DR	MIN PSI	TIME MIN MS	INIT REFL MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	1.1	171.6	-1.4	41.69	1.1	1.0	4.99	0.0	1.0	3.0	0.	-8.5	3.5
2	0.7	168.0	-0.8	50.41	0.7	0.3	10.36	0.0	0.6	1.0	0.	-2.9	0.7
3	0.5	165.4	-0.4	73.65	0.0	0.5	28.45	0.0	0.0	0.2	0.	0.0	0.3
4	0.5	164.5	-0.5	83.03	0.1	0.5	25.90	0.0	0.1	0.2	311.	-4.1	0.3
5	0.5	164.4	-0.6	31.77	0.0	0.5	23.95	0.0	0.0	0.2	0.	-7.8	0.3
6	0.5	164.7	-0.6	33.74	0.1	0.5	20.15	0.0	0.1	1.1	0.	-3.2	0.3
7	0.5	164.2	-0.5	46.61	0.2	0.5	5.05	0.0	0.2	6.0	312.	-5.5	1.6
8	0.4	163.8	-0.6	76.76	0.0	0.4	29.08	0.0	0.0	0.2	0.	-7.7	0.7
9	0.5	164.2	-0.6	61.51	0.0	0.5	19.90	0.0	0.0	0.2	0.	-11.1	0.8
10	0.4	163.8	-0.7	60.41	0.0	0.4	18.68	0.0	0.0	0.2	0.	-16.9	1.8
11	1.0	170.6	-1.2	46.24	0.9	1.0	9.61	0.0	0.9	19.4	0.	17.2	12.7
12	0.7	167.5	-1.3	29.18	0.7	0.6	1.11	0.0	0.7	3.1	312.	-15.6	1.2
13	1.0	170.5	-1.3	41.08	0.8	1.0	8.96	0.0	0.8	18.5	180.	-8.2	11.2
14	0.9	170.2	-1.2	41.48	0.7	0.9	4.06	0.0	0.7	11.4	214.	-6.7	7.2
15	0.9	169.6	-1.2	37.15	0.9	0.9	3.53	0.0	1.0	8.5	215.	-16.7	5.2
16	0.9	170.1	-1.3	36.71	0.8	0.9	3.58	0.0	1.0	8.6	187.	-13.7	5.4
17	0.9	169.9	-1.3	54.08	0.6	0.9	6.20	0.0	0.5	2.6	220.	-5.9	6.1
18	0.9	169.7	-1.2	54.05	0.6	0.9	6.10	0.0	0.8	2.6	249.	-12.3	5.6
19	0.8	169.2	-1.3	53.92	0.6	0.8	11.34	0.0	0.5	2.6	210.	-12.7	5.3
20	1.6	174.9	-1.2	9.40	1.4	1.6	2.03	0.0	1.4	3.1	135.	-15.0	2.7
21	1.5	174.5	-1.3	9.31	1.4	1.5	2.01	0.0	1.4	3.0	136.	-14.6	2.7
22	1.6	174.9	-1.2	9.40	1.3	1.6	2.05	0.0	1.3	3.1	178.	-5.2	2.8
23	1.4	173.8	-1.3	47.94	1.4	1.4	1.10	0.0	1.2	3.2	136.	-13.6	2.5
24	1.1	172.0	-1.2	47.46	1.1	1.0	0.51	0.0	0.9	3.1	208.	-8.8	2.2
25	1.1	171.7	-1.4	10.19	1.1	1.0	5.90	0.0	1.1	3.2	310.	-2.0	2.9
26	1.1	171.3	-1.1	47.66	1.0	1.1	3.45	0.0	0.9	2.7	205.	-11.6	4.6
27	1.0	170.5	-1.1	46.90	1.0	0.9	5.86	0.0	0.9	2.8	210.	-11.6	3.0
28	0.9	170.0	-1.1	46.29	0.9	0.9	4.06	0.0	1.1	7.9	197.	-13.6	4.6
29	2.8	179.7	-1.3	36.64	2.8	2.2	0.60	0.0	1.4	5.1	83.	-18.3	6.1
30	2.5	178.5	-1.4	34.99	2.5	2.2	0.61	0.0	1.4	5.0	101.	1.0	6.2
31	2.7	179.3	-1.2	7.34	2.7	2.2	0.61	0.0	1.5	5.1	81.	2.1	6.3
32	2.4	178.4	-1.2	41.99	2.4	1.9	1.11	0.0	1.8	6.9	59.	-10.4	6.9
33	2.1	177.3	-1.1	42.17	2.1	1.9	0.81	0.0	1.7	6.9	130.	11.5	7.2
34	2.1	177.2	-1.1	42.11	2.1	1.9	1.14	0.0	1.8	6.9	114.	6.2	7.0
35	1.7	175.4	-1.0	42.26	1.7	1.5	1.61	0.0	1.8	8.4	150.	5.3	8.2
36	1.1	171.4	-1.2	37.46	1.1	0.9	1.18	0.0	1.1	8.2	185.	-10.9	6.1
37	1.1	171.5	-1.1	37.88	1.1	1.0	1.15	0.0	1.1	8.3	188.	-11.7	6.0
38	1.5	174.3	-1.0	30.05	1.5	1.3	6.39	0.0	1.4	13.3	150.	-37.3	9.0
39	1.6	174.6	-1.0	29.88	1.6	1.2	6.34	0.0	1.4	6.3	303.	-42.2	9.1
40	1.5	174.4	-0.8	30.74	1.5	1.3	6.39	0.0	1.5	11.8	94.	-26.4	8.7
41	2.5	178.9	-0.1	311.38	2.5	2.1	0.95	0.0	2.7	10.8	0.	272.4	19.3
42	2.4	178.2	-0.1	311.49	2.4	2.0	0.85	0.0	2.4	10.7	0.	240.1	17.3
43	1.5	174.2	-1.9	300.04	1.5	1.1	0.59	0.0	1.4	10.4	228.	-99.7	8.0
44	1.5	174.1	-1.0	29.66	1.5	1.1	0.53	0.0	1.4	7.0	111.	-33.0	5.9
45	1.5	174.1	-1.0	30.59	1.5	1.1	0.61	0.0	1.4	7.0	132.	-18.7	5.8
46	1.5	174.3	-0.9	28.73	1.5	1.1	0.66	0.0	1.4	8.0	164.	-22.0	6.2

NOTE : THE GAUGE WAS INSIDE M109 FOR SHOTS 1-37 , THE RESULTING RECORDS DO NOT FOLLOW THE CLASSICAL PATTERN , SO THE PARAMETERS MAY NOT HAVE MEANING , THE RESULTS ARE INCLUDED FOR A SHOT TO SHOT COMPARISON .

Table 6-18. Gauge 8 - 16 May

M109 TEST 16 MAY 79 ABERDEEN PG

GAUGE 9

SHOT	MAXIMUM PRESSURE PSI	DB	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	3.1	180.6	-0.8	40.56	3.1	2.5	0.82	3.1	2.9	6.1	57.	-2.6	6.9
2	3.2	180.9	-1.0	25.94	3.2	2.6	0.82	3.2	3.0	5.1	56.	-3.4	6.7
3	3.5	181.6	-0.9	26.58	3.5	2.8	5.14	3.4	3.3	5.8	54.	-2.2	7.5
4	3.4	181.5	-0.9	26.99	3.4	2.7	0.96	3.5	3.3	5.9	58.	-1.6	7.3
5	4.1	183.0	-1.0	13.60	3.4	4.1	6.35	2.7	2.5	10.8	46.	0.6	13.0
6	3.5	181.7	-1.1	13.69	3.3	3.5	6.39	2.8	2.6	10.9	46.	-0.3	12.9
7	3.7	182.0	-1.0	13.41	3.1	3.7	6.38	2.8	2.6	10.6	50.	-0.5	13.1
8	3.3	181.1	-0.9	27.85	2.5	3.3	1.70	3.6	3.1	7.9	48.	-0.3	12.0
9	3.3	181.2	-0.9	28.21	1.6	3.3	1.70	1.7	1.6	8.0	54.	-0.7	11.8
10	3.4	181.4	-0.9	27.88	1.7	3.4	1.66	1.0	-0.5	7.9	56.	0.5	11.7
11	3.8	182.3	-1.1	36.09	3.8	2.5	1.11	4.0	3.7	4.6	60.	-9.2	6.4
12	3.5	181.6	-1.0	37.64	3.5	2.3	1.10	3.8	3.6	5.3	60.	-4.8	6.5
13	3.6	182.0	-1.0	22.33	3.6	2.3	1.02	4.1	3.9	6.6	60.	-7.8	6.8
14	2.6	179.0	-0.9	38.96	2.6	2.4	8.20	2.0	1.7	11.8	64.	-4.8	10.2
15	2.7	179.5	-0.9	39.34	2.7	2.0	8.38	2.1	1.8	11.4	59.	-4.1	9.4
16	2.5	178.5	-0.9	39.26	2.5	2.1	8.16	1.9	1.7	11.3	61.	-2.8	9.6
17	3.0	180.3	-0.9	12.25	1.4	3.0	2.66	1.2	1.0	9.7	59.	-3.4	9.7
18	2.9	180.0	-0.9	40.46	1.5	2.9	2.83	1.3	1.1	9.4	59.	-3.3	9.6
19	2.8	179.5	-0.9	40.61	1.8	2.8	2.75	1.3	1.1	9.4	59.	-1.6	10.0
20	3.5	181.6	-0.8	23.83	3.5	3.1	5.54	2.9	2.8	8.9	48.	-7.3	10.5
21	3.2	180.9	-0.7	32.30	3.2	2.7	5.50	2.8	2.7	5.4	51.	-5.7	10.8
22	3.0	180.3	-0.8	24.10	3.0	3.0	5.56	2.7	2.5	10.8	53.	-9.1	11.6
23	3.0	180.1	-0.6	31.52	3.0	2.3	0.61	2.4	2.3	10.4	55.	-3.3	10.5
24	3.2	180.8	-0.7	37.06	3.2	2.4	0.63	2.6	2.5	9.4	55.	-4.1	9.9
25	2.9	179.9	-0.7	17.05	2.9	2.3	3.30	2.3	2.2	10.9	55.	-5.8	11.0
26	3.0	180.3	-0.7	31.89	3.0	3.0	0.65	2.7	2.7	6.9	51.	-4.5	9.9
27	3.7	182.1	-0.6	36.48	3.7	3.0	0.65	3.0	2.8	7.0	52.	-3.6	9.9
28	2.9	179.9	-0.8	29.40	2.8	2.9	1.55	3.0	2.9	7.1	53.	-2.8	9.8
29	1.6	174.7	-0.5	33.35	0.7	1.6	5.85	0.7	0.6	10.8	60.	-0.6	8.1
30	1.6	174.8	-0.5	34.16	0.7	1.6	6.65	0.7	0.6	10.4	60.	0.1	7.9
31	1.5	174.4	-0.5	15.48	0.7	1.5	6.36	0.8	0.7	10.4	61.	-0.3	7.8
32	1.7	175.5	-0.5	36.08	0.8	1.7	3.19	0.7	0.7	9.3	50.	-0.9	7.8
33	1.7	175.6	-0.5	35.90	0.8	1.7	3.59	0.8	0.8	9.7	55.	-0.3	7.6
34	1.7	175.5	-0.4	11.90	0.8	1.7	3.49	0.8	0.8	9.3	56.	-0.6	7.5
35	2.4	178.3	-0.5	29.05	2.0	2.4	1.18	2.2	1.7	7.6	45.	-0.5	7.3
36	2.5	178.8	-0.5	37.86	2.1	2.5	1.04	2.6	2.4	8.8	45.	-0.6	7.3
37	2.4	178.5	-0.4	29.74	2.0	2.4	1.21	1.5	1.3	7.4	46.	-2.0	7.3
38	1.6	175.0	-0.9	35.73	1.6	1.6	3.50	2.0	1.6	0.0	57.	-0.1	2.1
39	1.6	174.8	-0.9	35.75	1.5	1.6	3.50	2.0	1.6	0.0	62.	-0.4	4.3
40	1.6	174.7	-0.8	33.05	1.6	1.5	3.59	2.1	1.7	0.0	102.	-1.1	3.7
41	1.5	174.2	-0.9	20.59	1.3	1.5	7.38	1.3	1.2	11.9	107.	1.8	10.4
42	1.5	174.4	-0.8	20.69	1.1	1.5	2.80	1.1	1.1	11.5	59.	-0.2	9.9
43	1.6	174.7	-0.8	19.95	1.1	1.6	2.80	1.2	1.1	0.0	59.	0.5	7.8
44	1.7	175.6	-1.1	29.13	1.2	1.7	3.42	1.1	1.1	10.8	51.	-0.2	10.4
45	1.7	175.6	-1.1	29.24	1.2	1.7	2.59	1.3	1.2	10.8	50.	2.0	10.2
46	1.8	175.8	-1.1	28.24	1.3	1.8	2.50	1.2	1.2	10.7	56.	-0.4	10.6

Table 6-19. Gauge 9 - 16 May

M109 TEST 16 MAY 79 ABERDEEN PG

GAUGE 10

SHOT	MAXIMUM PRESSURE PSI	DR	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	3.6	181.8	-0.9	41.23	3.6	3.0	3.21	2.8	2.7	5.1	57.	-1.9	7.0
2	3.4	181.4	-0.9	40.29	3.4	2.8	0.56	2.8	2.8	5.9	56.	-0.6	7.5
3	3.9	182.5	-1.1	37.65	3.9	2.9	3.23	3.0	2.9	6.8	50.	-1.1	7.8
4	3.4	181.5	-1.0	37.67	3.4	3.1	3.21	2.8	2.7	4.8	58.	-2.2	7.1
5	2.9	179.9	-1.0	13.35	2.2	2.9	7.19	2.4	2.4	10.2	57.	-0.2	13.9
6	3.0	180.4	-1.0	13.75	2.2	3.0	7.11	2.4	2.3	10.1	57.	-0.1	14.0
7	2.8	179.7	-1.1	15.05	2.2	2.8	7.26	2.5	2.4	10.0	57.	-0.9	13.9
8	3.5	181.5	-1.0	10.80	3.4	3.5	1.52	3.5	3.3	7.9	57.	-0.3	12.3
9	3.4	181.3	-1.0	10.80	2.9	3.4	1.36	2.2	1.8	7.2	48.	-1.8	12.0
10	3.4	181.5	-0.9	10.61	3.4	3.4	1.49	3.6	3.3	6.2	57.	-0.3	11.7
11	3.2	180.8	-1.1	37.20	3.2	2.8	0.86	2.2	2.0	5.4	64.	-3.2	6.7
12	2.9	180.1	-1.1	39.16	2.9	2.4	1.00	3.0	2.9	5.8	65.	-1.8	6.5
13	2.9	180.1	-1.0	36.53	2.9	2.5	0.99	3.3	3.2	6.5	65.	-2.7	6.9
14	3.3	181.0	-0.9	39.79	3.3	2.5	8.04	2.4	2.1	11.7	63.	-2.8	10.9
15	2.5	178.8	-1.0	38.25	2.5	2.1	7.93	1.9	1.7	11.3	68.	-1.9	10.1
16	2.5	178.7	-0.9	39.91	2.5	2.0	7.93	1.9	1.7	11.7	67.	-1.9	10.2
17	2.8	179.7	-1.0	26.20	1.6	2.8	2.42	1.2	1.1	9.4	63.	-3.9	10.1
18	2.8	179.7	-1.0	12.50	1.5	2.8	2.51	2.3	2.0	8.0	60.	-2.1	9.8
19	2.8	179.7	-0.9	39.79	1.5	2.8	2.42	1.8	1.8	9.1	59.	-1.7	10.4
20	3.9	182.5	-0.8	22.89	3.9	3.0	0.55	3.6	3.6	6.0	53.	-4.0	8.8
21	3.9	182.5	-1.0	23.05	3.9	2.8	0.55	3.5	3.4	5.6	52.	-4.4	8.8
22	3.9	182.5	-1.0	24.75	3.9	3.0	0.55	3.3	3.2	5.9	52.	-5.0	8.5
23	3.4	181.4	-0.9	33.85	3.4	3.1	3.79	2.8	2.7	10.1	54.	-4.1	12.9
24	3.2	180.7	-0.9	38.61	3.2	3.1	0.82	3.1	3.0	9.9	54.	-2.9	13.0
25	3.7	182.1	-0.8	37.80	3.7	3.4	3.75	3.1	3.0	8.4	50.	-5.4	12.5
26	3.7	182.2	-0.9	8.04	3.7	3.7	0.73	3.0	2.9	6.7	58.	-3.3	13.0
27	3.9	182.5	-1.0	8.36	3.9	3.6	0.75	3.3	3.1	6.1	56.	-5.1	12.3
28	3.7	182.2	-0.8	25.55	3.7	3.7	1.26	3.9	3.6	6.3	56.	-4.5	12.6
29	2.5	178.6	-0.7	23.27	2.5	2.2	4.85	2.1	2.1	11.8	51.	-1.9	10.1
30	2.6	179.0	-0.6	40.66	2.6	2.2	4.86	2.2	2.1	8.9	51.	-1.7	9.1
31	2.5	178.7	-0.6	31.44	2.5	2.1	4.89	2.1	2.1	9.7	50.	-3.7	9.0
32	2.3	178.0	-0.7	35.79	2.3	2.2	2.55	2.1	2.0	11.0	50.	-1.8	10.5
33	2.3	177.8	-0.6	39.99	2.1	2.3	2.55	2.0	2.0	10.2	55.	-2.1	10.0
34	2.3	177.9	-0.7	36.91	2.3	2.0	2.58	2.0	1.9	10.1	50.	-1.7	9.8
35	2.9	180.1	-0.6	36.60	2.9	2.7	0.55	2.5	2.4	7.8	46.	-2.3	8.8
36	3.4	181.5	-0.6	35.28	3.4	2.8	0.55	2.8	2.7	8.4	46.	-0.4	9.0
37	3.0	180.2	-0.6	36.08	3.0	2.7	0.55	2.4	2.3	8.2	47.	-0.9	8.9
38	1.6	175.0	-0.9	33.13	1.4	1.6	2.59	1.6	1.6	5.9	85.	-1.1	6.0
39	1.7	175.3	-0.8	32.25	1.5	1.7	2.67	1.6	1.5	0.0	86.	-1.9	3.4
40	1.5	174.2	-1.0	31.73	1.5	1.5	2.67	1.5	1.4	0.0	157.	-0.9	3.1
41	1.4	173.4	-0.9	35.49	1.3	1.4	8.49	1.5	1.5	13.4	158.	-0.3	10.8
42	1.3	173.2	-0.9	37.71	1.3	1.3	8.03	1.5	1.5	12.6	163.	-1.4	9.7
43	1.4	173.5	-1.0	35.64	1.4	1.3	8.03	1.5	1.5	11.5	114.	-1.1	9.8
44	1.7	175.3	-1.0	36.19	1.2	1.7	3.86	1.3	1.2	11.6	112.	-0.1	10.3
45	1.7	175.4	-1.1	35.67	1.2	1.7	3.85	1.1	1.0	11.5	118.	-1.0	10.0
46	1.8	175.6	-0.9	35.00	1.3	1.8	3.84	1.3	1.2	12.0	102.	-0.4	10.8

Table 6-20. Gauge 10 - 16 May

M109 TEST 17 MAY 79 ABERDEEN PG

GAUGE 1

SHOT	MAXIMUM PRESSURE PSI	DR	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	3.6	181.8	-1.1	35.26	3.6	3.5	1.09	4.0	3.7	5.1	61.	-4.1	7.8
2	3.6	181.9	-1.1	33.51	3.6	3.4	1.06	3.8	3.7	5.1	61.	-5.9	7.8
3	3.8	182.2	-0.9	36.00	3.8	3.5	1.06	4.2	4.1	4.2	62.	-3.9	7.5
4	2.8	179.6	-1.0	22.40	2.8	2.1	1.45	3.4	3.2	5.2	66.	-1.0	5.7
5	2.5	178.6	-0.9	22.36	2.4	2.5	1.05	2.8	2.5	5.1	71.	-0.9	5.6
6	2.7	179.3	-1.0	37.65	2.7	2.7	1.02	3.9	3.5	5.1	67.	-1.7	5.7
7	1.9	176.4	-1.0	36.76	1.8	1.9	2.21	2.0	2.0	11.0	105.	-1.9	10.3
8	1.9	176.3	-1.0	36.50	1.7	1.9	2.16	1.9	1.9	11.5	82.	-3.9	10.1
9	1.8	176.0	-1.0	32.21	1.7	1.8	2.16	1.9	1.9	11.8	103.	-5.6	10.1
10	1.5	174.4	-0.4	26.33	1.3	1.5	3.48	1.1	1.1	12.4	64.	-2.8	7.7
11	1.3	173.0	-0.4	40.61	1.2	1.3	4.53	1.3	1.2	10.5	64.	-3.2	7.2
12	1.6	174.8	-0.4	29.48	1.2	1.6	3.46	1.1	1.0	12.1	64.	-2.3	7.8
13	1.4	173.6	-0.4	36.26	1.1	1.4	1.00	0.8	0.8	11.0	60.	-1.9	6.6
14	1.4	173.7	-0.3	37.60	1.4	1.4	1.05	1.4	1.3	11.0	61.	-1.5	6.8
15	1.5	174.4	-0.3	27.11	1.5	1.4	1.77	1.6	1.4	11.6	59.	-1.8	6.8
16	1.6	174.6	-0.4	29.50	1.6	1.4	0.85	1.7	1.6	10.4	58.	-1.8	6.1
17	1.6	175.1	-0.4	29.99	1.6	1.5	0.82	1.8	1.7	10.1	59.	-0.5	6.2
18	1.7	175.4	-0.4	29.73	1.7	1.5	0.82	1.8	1.8	10.5	55.	-1.4	6.3
19	1.8	175.9	-0.5	27.80	1.3	1.8	2.98	0.0	1.4	9.1	55.	-2.0	7.2
20	1.7	175.5	-0.5	28.02	1.3	1.7	3.00	0.0	1.3	9.3	54.	-1.0	7.3
21	1.9	176.4	-0.4	28.84	1.4	1.9	2.90	0.0	1.4	9.6	54.	-2.7	7.4
22	1.8	175.9	-0.4	19.83	1.8	1.5	1.65	0.0	2.1	11.2	56.	-1.2	6.8
23	1.9	176.4	-0.4	39.73	1.8	1.9	1.08	0.0	2.0	10.8	56.	-1.9	6.8
24	1.8	175.8	-0.4	33.90	1.8	1.8	1.08	0.0	1.7	10.9	57.	-2.7	7.2
25	2.1	177.3	-0.4	32.45	2.1	1.6	0.84	0.0	2.2	9.1	56.	-0.2	6.3
26	2.1	177.1	-0.4	35.80	2.1	1.6	1.11	0.0	2.2	9.3	50.	-2.1	6.3
27	2.1	177.2	-0.4	29.69	2.1	1.7	0.99	1.7	1.6	7.1	48.	-2.7	6.0
28	3.7	182.1	-0.9	24.88	3.7	3.2	5.51	0.0	2.7	5.4	48.	-3.1	13.2
29	3.4	181.4	-0.9	24.61	3.4	3.2	5.43	0.0	2.6	5.3	54.	-1.9	13.3
30	3.8	182.4	-1.0	23.81	3.5	3.8	5.47	0.0	3.7	5.4	49.	-2.5	8.1
31	3.2	180.7	-0.6	36.95	3.2	2.5	3.19	0.0	2.5	9.6	51.	-1.4	11.5
32	3.2	180.9	-0.6	36.44	3.2	2.3	0.80	0.0	2.2	10.6	48.	-1.4	11.9
33	3.0	180.4	-0.5	24.35	3.0	2.4	3.05	0.0	2.4	11.1	51.	-1.1	11.9
34	3.7	182.1	-0.7	31.05	3.6	3.7	1.64	0.0	4.0	6.7	49.	-1.1	11.0
35	3.6	181.8	-0.7	33.26	3.6	3.2	1.70	0.0	3.9	7.3	50.	3.2	11.1
36	3.9	182.7	-0.7	29.74	3.9	3.0	0.96	0.0	4.3	7.3	46.	0.9	11.3
37	1.7	175.5	-0.4	25.05	1.7	1.3	3.83	1.4	1.3	13.3	57.	-1.9	9.0
38	1.7	175.6	-0.6	21.66	1.7	1.4	4.33	1.4	1.3	14.1	58.	-2.8	9.8
39	1.5	174.5	-0.5	22.20	1.5	1.5	3.67	1.3	1.3	13.6	59.	-2.5	9.8
40	1.5	174.6	-0.5	23.19	1.3	1.5	2.23	1.0	1.0	12.0	58.	-2.2	8.5
41	1.5	174.1	-0.5	24.83	1.3	1.5	1.58	1.1	1.0	11.4	58.	-1.5	8.0
42	1.6	174.8	-0.5	25.36	1.3	1.6	1.55	1.1	1.0	11.5	58.	-2.1	8.6
43	1.9	176.3	-0.4	33.16	1.9	1.5	0.93	2.0	1.9	10.7	56.	-1.9	7.3
44	2.0	176.6	-0.6	22.84	1.6	2.0	3.28	1.4	1.3	12.0	57.	-1.9	8.9
45	1.8	175.9	-0.4	32.50	1.5	1.8	3.30	1.3	1.2	12.3	56.	-2.1	8.1
46	1.8	176.0	-0.5	22.81	1.5	1.8	3.31	1.3	1.2	12.0	57.	-3.3	9.2
47	2.3	177.9	-0.5	25.52	1.5	2.3	1.52	1.2	1.1	11.0	52.	-2.8	8.2
48	2.0	176.7	-0.4	17.21	1.4	2.0	1.45	1.2	1.1	10.4	52.	-2.0	8.1
49	1.9	176.5	-0.5	24.74	1.5	1.9	1.55	1.2	1.2	10.9	56.	-2.3	8.2
50	2.2	177.8	-0.5	29.33	2.2	1.9	0.93	2.0	1.9	9.3	50.	-2.2	8.1
51	2.3	177.8	-0.5	29.30	2.3	1.8	0.64	2.0	1.9	8.9	52.	-1.9	7.7
52	2.2	177.8	-0.4	16.14	2.2	1.7	0.63	2.0	1.9	8.8	50.	-1.6	7.9
53	2.4	178.3	-0.6	27.45	2.0	2.4	4.11	2.2	2.1	9.1	54.	-2.1	8.7
54	2.4	178.5	-0.6	28.70	1.9	2.4	4.15	2.2	2.1	8.8	53.	-1.5	8.5
55	2.4	178.5	-0.5	36.89	2.0	2.4	4.13	2.2	2.1	8.4	46.	-1.6	8.4
56	2.0	176.6	-0.6	34.20	1.8	2.0	2.17	1.5	1.5	10.2	75.	-1.4	8.2
57	2.0	177.0	-0.5	36.01	1.7	2.0	2.17	1.5	1.5	10.6	75.	-1.1	8.4
58	2.5	178.8	-0.5	37.39	1.9	2.5	2.17	1.6	1.5	9.1	46.	-1.0	8.1
59	2.5	178.6	-0.5	31.16	2.5	1.9	0.57	2.1	1.9	8.0	74.	-1.2	7.4
60	2.4	178.3	-0.5	28.50	2.4	1.9	0.54	2.1	1.9	9.2	49.	-2.0	7.6
61	2.4	178.3	-0.6	29.23	2.4	1.9	0.70	2.0	1.9	7.3	74.	-2.0	7.3

Table 6-21. Gauge 1 - 17 May

M109 TEST 17 MAY 79 ABERDEEN PG

GAUGE 2

SHOT	MAXIMUM PRESSURE PSI	DR	MIN PST	TIME MIN MS	INIT REFL MAX PSI	REFL MAX PST	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	3.6	181.8	-0.9	38.66	3.6	2.7	0.55	2.9	2.8	5.9	57.	-2.3	7.4
2	3.3	181.0	-0.8	39.26	3.3	2.8	0.55	2.9	2.8	5.7	58.	-1.2	7.3
3	4.0	182.7	-0.8	42.17	4.0	2.7	0.55	3.1	3.0	5.9	52.	-0.9	7.4
4	2.3	177.9	-1.0	12.20	2.3	2.2	6.64	2.7	2.5	10.0	66.	1.2	12.6
5	2.2	177.4	-1.1	13.16	2.2	2.0	6.46	2.5	2.2	10.2	68.	0.6	12.4
6	2.3	177.8	-1.1	13.11	2.3	2.0	6.58	2.5	2.3	10.2	67.	-1.1	13.0
7	3.5	181.7	-0.8	43.20	2.7	3.5	1.21	1.7	0.8	8.1	48.	-0.4	11.8
8	3.6	181.9	-0.9	11.00	3.0	3.6	1.24	3.1	2.5	8.0	48.	-1.5	11.1
9	3.4	181.3	-0.8	41.86	2.5	3.4	1.41	2.2	1.3	8.0	49.	-0.5	11.3
10	1.5	174.0	-0.4	25.98	1.4	1.5	5.21	1.3	1.2	17.1	75.	-4.0	8.8
11	1.4	173.9	-0.4	37.65	1.3	1.4	4.44	1.1	1.1	11.7	71.	-3.6	8.2
12	1.5	174.1	-0.4	29.06	1.3	1.5	4.90	1.2	1.1	11.6	71.	-4.2	8.9
13	1.5	174.3	-0.4	36.70	1.2	1.5	1.50	1.1	1.0	11.3	69.	-0.6	7.5
14	1.5	174.3	-0.4	39.40	1.3	1.5	1.59	1.0	1.0	11.4	69.	-1.8	7.6
15	1.5	174.5	-0.4	32.17	1.1	1.5	2.10	0.9	0.9	11.9	69.	-0.3	7.6
16	1.7	175.5	-0.5	28.24	1.7	1.5	1.00	1.6	1.5	10.8	68.	-0.5	6.6
17	1.8	175.7	-0.4	29.83	1.8	1.5	0.93	1.6	1.6	10.7	68.	-1.1	6.7
18	1.9	176.4	-0.5	30.15	1.9	1.6	1.02	1.8	1.7	10.8	68.	-0.8	6.8
19	1.7	175.5	-0.5	33.36	1.5	1.7	3.64	0.0	1.3	9.6	71.	-3.5	8.0
20	1.8	175.8	-0.6	30.20	1.5	1.8	4.09	0.0	1.3	9.9	71.	-2.3	8.3
21	2.0	176.7	-0.4	29.71	1.5	2.0	3.58	0.0	1.3	10.4	57.	-4.1	8.4
22	2.0	176.6	-0.4	19.86	1.6	2.0	1.31	0.0	1.4	11.2	68.	-1.8	7.6
23	2.0	176.7	-0.5	33.98	1.6	2.0	1.45	0.0	1.3	11.3	68.	-1.8	7.5
24	1.9	176.3	-0.4	32.28	1.6	1.9	1.34	0.0	1.4	9.1	69.	-3.2	7.3
25	2.4	178.3	-0.5	31.96	2.4	1.9	0.89	2.3	2.1	7.7	68.	-0.2	6.8
26	2.2	177.5	-0.4	30.51	2.2	1.8	1.56	2.1	1.9	7.8	68.	-2.8	6.9
27	2.2	177.5	-0.5	31.00	2.2	1.8	0.71	2.1	1.9	7.6	52.	-4.6	6.6
28	3.5	181.5	-0.8	29.26	3.5	2.5	0.75	0.0	3.0	10.6	48.	-2.3	11.1
29	3.5	181.7	-0.8	38.75	3.5	2.5	0.75	0.0	3.1	9.6	48.	-3.7	8.8
30	3.7	182.1			3.7	2.7	0.63	3.3	3.2	10.4	47.	-3.8	11.3
31	2.4	178.3	-0.8	36.34	2.0	2.4	6.34	0.0	1.7	10.3	56.	-0.5	11.9
32	2.4	178.5			2.2	2.4	6.10	1.8	1.7	10.2	55.	-3.3	12.0
33	2.5	178.6	-0.7	35.78	2.1	2.5	6.14	0.0	1.9	10.5	57.	1.1	12.2
34	3.9	182.6	-0.7	25.44	3.9	2.9	1.49	0.0	4.0	8.4	48.	-1.7	10.8
35	3.9	182.6	-0.6	29.18	3.9	2.9	1.56	0.0	3.9	9.2	47.	0.3	11.0
36	3.8	182.4	-0.7	30.64	3.7	3.8	1.02	0.0	3.8	9.2	46.	-1.3	11.1
37	1.8	175.7	-0.5	30.52	1.8	1.7	4.90	1.7	1.6	13.9	64.	-4.8	11.0
38	1.9	176.5	-0.7	25.65	1.9	1.7	6.80	1.6	1.6	15.3	64.	-6.1	11.7
39	1.9	176.5	-0.6	23.65	1.9	1.7	5.47	1.6	1.5	13.9	64.	-2.7	11.6
40	1.8	175.8	-0.5	25.91	1.5	1.8	2.31	1.3	1.2	12.1	62.	-2.3	10.0
41	1.7	175.1	-0.5	22.96	1.5	1.7	2.36	1.4	1.3	12.2	57.	-2.6	9.8
42	1.7	175.5	-0.6	25.09	1.6	1.7	2.35	1.3	1.3	12.2	64.	-2.1	10.3
43	2.3	177.8	-0.5	31.43	2.3	1.9	0.99	2.3	1.9	10.8	52.	-1.8	8.6
44	2.1	177.3	-0.6	22.25	2.1	2.1	4.01	1.8	1.8	12.4	59.	-2.3	11.0
45	2.1	177.1			2.1	2.1	4.24	1.7	1.7	10.5	63.	-6.4	8.5
46	1.9	176.3	-0.6	22.13	1.9	1.9	4.01	1.7	1.7	12.6	59.	-1.7	11.3
47	2.7	179.3	-0.6	25.42	1.8	2.7	2.14	1.8	1.6		47.	-5.4	7.7
48	2.4	178.3			1.9	2.4	2.00	1.7	1.6	11.0	50.	-7.7	9.9
49	2.3	177.8	-0.6	24.51	1.9	2.3	1.93	1.7	1.6	9.2	49.	-2.0	9.3
50	2.7	179.4	-0.6	32.21	2.7	2.2	0.70	2.5	2.4	9.3	52.	-3.6	9.4
51	2.8	179.8	-0.6	29.23	2.8	2.2	0.88	2.6	2.4	8.8	46.	-2.5	9.0
52	3.1	180.5	-0.6	16.36	3.1	2.3	0.57	2.6	2.5	7.8	45.	-2.8	9.4
53	2.3	178.1			2.0	2.3	4.51	1.7	1.7	9.5	55.	-3.6	9.1
54	2.3	178.0	-0.6	31.23	2.1	2.3	4.55	1.9	1.8	9.2	79.	-1.4	8.9
55	2.5	178.5	-0.6	27.85	2.0	2.5	4.51	1.7	1.6	9.5	47.	-1.8	9.1
56	2.0	177.0	-0.5	38.95	1.8	2.0	2.29	1.7	1.6	11.6	77.	-1.7	9.7
57	2.3	177.9	-0.5	37.39	1.8	2.3	2.30	1.7	1.6	10.6	77.	-3.1	8.8
58	2.6	179.0			1.9	2.6	2.30	1.7	1.7	9.1	46.	-0.1	8.6
59	2.8	179.5	-0.5	28.30	2.8	2.2	0.56	2.4	2.3	8.0	50.	-1.3	7.9
60	2.7	179.2	-0.6	29.96	2.7	2.3	0.53	2.4	2.3	8.3	50.	-2.5	8.0
61	2.6	179.0	-0.6	29.14	2.6	2.3	0.69	2.4	2.3	8.5	49.	-3.7	7.9

Table 6-22. Gauge 2 - 17 May

M109 TEST 17 MAY 79 ABERDEEN PG

GAUGE 3

SHOT	MAXIMUM PRESSURE PSI	DR	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-MS	POS IMP	
1	3.7	182.2	-0.9	28.84	3.5	3.7	6.44	2.3	2.2	6.4	52.	-12.3	7.7	
2	3.6	181.8	-0.9	29.35	3.2	3.6	6.49	3.1	2.8	6.4	52.	-10.6	8.1	
3	3.3	181.2	-0.9	30.86	3.3	2.8	6.46	2.4	2.3	6.2	54.	-6.4	12.5	
4	3.0	180.2	-0.8	30.89	3.0	2.8	3.78	3.0	2.8	7.3	50.	-3.0	10.4	
5	2.9	180.1	-0.7	30.51	2.6	2.9	3.75	2.5	2.3	7.2	67.	-6.4	10.0	
6	3.7	182.1	-0.9	25.44	3.3	3.7	3.74	3.2	3.0	8.3	49.	-4.7	11.0	
7	3.5	181.6	-0.9	29.65	3.5	3.1	2.25	4.5	4.1	8.0	47.	-4.9	11.6	
8	3.7	182.0	-1.0	29.74	3.7	3.2	1.60	4.4	4.1	7.6	47.	-8.2	11.5	
9	3.4	181.5	-0.9	27.20	3.4	2.9	1.48	4.7	4.0	7.5	50.	-6.5	11.3	
10	1.3	172.8	-0.6	21.04	1.3	1.2	0.94	1.3	1.2	0.0	80.	-4.6	5.1	
11	1.3	172.8	-0.4	28.45	1.3	1.1	1.09	1.3	1.1	8.7	93.	-5.7	4.9	
12	1.3	172.7	-0.4	25.19	1.2	1.3	4.84	1.2	1.1	13.3	85.	-0.7	8.8	
13	1.3	173.0	-0.4	32.17	1.1	1.3	1.91	1.1	1.0	0.0	88.	0.8	5.4	
14	1.3	173.1	-0.4	31.31	1.1	1.3	3.17	1.1	1.0	0.0	83.	-2.4	3.5	
15	1.4	173.4	-0.4	30.48	1.0	1.4	2.64	0.8	0.8	0.0	83.	-2.7	3.7	
16	1.7	175.3	-0.5	30.21	1.7	1.5	1.55	2.4	2.3	6.6	59.	0.7	6.1	
17	1.8	175.9	-0.5	30.81	1.8	1.8	1.55	2.5	2.3	6.4	52.	-0.8	6.2	
18	1.9	176.1	-0.5	29.75	1.9	1.6	1.52	2.6	2.4	6.4	82.	0.7	6.1	
19	2.4	178.4	-0.5	33.01	1.7	2.4	4.70	0.0	1.6	4.6	50.	-1.8	7.7	
20	2.6	179.0	-0.6	26.05	1.8	2.6	4.71	0.0	1.3	4.6	50.	-1.9	8.3	
21	2.6	179.0	-0.6	25.64	1.8	2.6	4.66	0.0	1.8	11.8	50.	-2.7	8.5	
22	1.9	176.1	-0.4	19.64	1.8	1.9	2.14	0.0	1.6	11.5	52.	-1.1	7.4	
23	2.1	177.2	-0.5	35.65	1.8	2.1	2.15	0.0	1.6	11.4	50.	-1.5	7.4	
24	2.0	176.6	-0.5	22.50	2.0	2.0	2.09	0.0	1.4	8.3	50.	0.0	7.3	
25	2.4	178.5	-0.5	32.00	2.4	2.0	1.00	0.0	2.2	7.5	49.	-0.5	6.7	
26	2.3	178.1	-0.5	31.91	2.3	2.0	1.00	0.0	2.0	7.2	49.	-1.1	6.8	
27	2.5	178.6	-0.5	32.65	2.5	2.1	0.96	0.0	2.0	7.5	48.	0.9	6.6	
28	2.8	179.6	-0.8	37.69	2.8	2.4	0.99	0.0	2.8	5.9	57.	-5.3	6.3	
29	2.7	179.4	-0.7	37.28	2.7	2.0	1.44	0.0	2.8	6.0	56.	-3.4	6.4	
30	2.9	180.0	-1.1	196.40	2.9	2.5	0.98	3.1	2.7	6.3	51.	1.6	6.7	
31	2.3	178.1	-0.8	36.09	1.8	2.3	6.43	0.0	2.1	11.0	65.	0.1	10.9	
32	2.1	177.2	-0.8	34.01	1.7	2.1	6.44	0.0	2.0	10.9	64.	-4.4	11.1	
33	2.0	176.8	-0.8	38.85	1.8	2.0	6.44	0.0	2.1	11.0	64.	0.6	10.8	
34	2.8	179.7	-0.8	23.36	2.6	2.8	1.24	0.0	2.9	7.7	49.	0.0	10.1	
35	2.9	180.0	-0.7	10.69	2.8	2.9	1.55	0.0	2.5	7.8	50.	-1.0	10.7	
36	2.7	179.5	-0.8	40.50	2.6	2.7	2.29	0.0	2.6	8.6	59.	-2.0	10.7	
37	1.6	175.1	-0.6	30.66	1.6	1.5	7.38	1.7	1.5	15.0	76.	-5.3	12.0	
38	1.8	176.0	-0.6	29.71	1.7	1.8	7.33	1.7	1.6	15.4	61.	-5.6	12.4	
39	1.8	175.8	-0.6	20.81	1.8	1.5	5.15	1.2	1.2	14.5	106.	-9.1	11.9	
40	1.8	175.9	-0.5	27.74	1.6	1.8	3.08	1.7	1.6	12.7	55.	-5.2	10.3	
41	1.7	175.4	-0.6	26.63	1.7	1.7	2.64	1.8	1.6	12.4	53.	-4.0	10.3	
42	1.7	175.5	-0.5	28.68	1.7	1.7	2.60	1.8	1.6	12.2	80.	-5.1	10.8	
43	2.5	178.6	-0.5	32.46	2.5	2.0	1.59	2.9	2.6	9.8	51.	-2.6	9.2	
44	2.8	179.8	-0.7	20.99	2.6	2.8	5.00	1.9	1.8	11.7	53.	-8.2	11.3	
45	2.6	179.1	-0.7	28.04	2.4	2.6	4.93	2.2	2.1	10.5	54.	-8.2	10.3	
46	3.0	180.3	-0.7	27.79	2.4	3.0	4.97	1.9	1.8	13.3	49.	-10.3	12.4	
47	2.5	178.7	-0.6	18.88	2.3	2.5	2.60	2.5	2.1	10.9	52.	-8.1	10.5	
48	2.4	178.5	-0.6	15.94	2.1	2.4	2.58	2.3	2.0	10.0	66.	-6.8	10.2	
49	2.2	177.6	-0.7	23.89	2.2	2.2	2.55	2.3	2.0	10.1	104.	-7.0	10.0	
50	3.2	180.7	-0.6	33.40	3.2	2.5	0.99	3.2	3.0	9.2	50.	-2.7	10.0	
51	3.3	181.2	-0.6	32.11	3.3	2.5	0.96	3.5	3.4	7.8	48.	-3.0	9.5	
52	3.5	181.7	-0.8	15.45	3.5	2.7	0.99	3.6	3.4	7.9	43.	-4.4	10.2	
53	4.4	183.5	-1.0	222.80	3.7	4.4	6.18	2.9	2.7	6.1	86.	-47.7	8.1	SEVERE TRANSDUCER
54	4.0	182.8	-1.4	218.63	3.6	4.0	6.19	2.9	2.6	12.5	102.	-60.8	14.8	DRIFTS BEGINNING
55	2.0	176.9	-1.0	222.64	1.6	2.0	6.18	1.5	1.5	12.6	185.	-46.0	7.5	WITH SHOT 53 ,
56	3.4	181.5	-1.2	219.31	3.3	3.4	3.81	3.3	2.8	9.4	172.	-60.3	13.3	SHOTS 53-61 ARE
57	3.5	181.7	-1.0	215.49	3.3	3.5	3.81	2.8	2.4	10.1	136.	-42.7	13.9	QUESTIONABLE .
58	3.4	181.4	-1.1	16.48	3.3	3.4	4.47	2.9	2.7	10.6	48.	-12.9	13.7	
59	4.4	183.7	-1.4	215.65	4.4	3.5	1.10	3.6	3.1	8.1	89.	-54.3	13.5	
60	4.1	182.9	-0.7	10.61	4.1	3.5	1.09	3.2	3.0	8.4	73.	-27.6	13.2	
61	3.9	182.6	-1.3	220.15	3.9	3.3	1.68	4.5	4.0	8.0	105.	-56.8	13.5	

Table 6-23. Gauge 3 - 17 May

M109 TEST 17 MAY 79 ABERDEEN PG

GAUGE 4

SHOT	MAXIMUM PRESSURE PSI	DB	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-MS	POS IMP
1	3.5	181.7	-0.8	28.81	3.5	2.5	1.06	3.1	3.0	4.3	47.	-1.0	6.5
2	3.5	181.7	-0.7	38.56	3.5	2.5	0.54	3.2	3.1	5.6	46.	4.6	6.7
3	3.8	182.3	-0.7	40.44	3.8	2.6	0.53	3.4	3.3	5.6	48.	1.3	7.1
4	2.8	179.7	-0.8	16.20	2.7	2.8	4.51	2.0	1.9	9.1	54.	-1.7	11.3
5	2.4	178.2	-0.9	13.35	2.4	2.1	4.26	2.1	2.1	9.2	67.	1.5	11.3
6	2.3	178.1	-0.7	13.46	2.3	2.2	6.58	2.2	2.1	9.5	55.	-1.1	11.7
7	3.6	181.9	-0.8	10.31	3.4	3.6	1.02	4.5	4.2	8.3	47.	-6.3	10.8
8	3.4	181.3	-0.8	11.15	3.2	3.4	1.04	3.9	3.6	8.5	48.	0.0	10.5
9	3.5	181.5	-0.8	10.45	3.5	3.1	1.63	4.3	4.1	7.9	48.	0.1	10.6
10	1.4	173.8	-0.5	42.09	1.4	1.4	3.26	1.3	1.3	10.9	72.	-2.2	6.8
11	1.3	173.3	-0.4	36.08	1.3	1.3	3.26	1.2	1.2	10.4	72.	-2.5	6.6
12	1.3	173.0	-0.4	31.50	1.3	1.3	3.86	1.3	1.3	10.2	72.	-2.5	6.8
13	1.4	173.4	-0.5	35.98	1.2	1.4	2.70	1.1	1.0	9.5	69.	-1.7	6.4
14	1.4	173.7	-0.4	34.31	1.1	1.4	3.31	0.9	0.9	10.1	70.	0.8	6.7
15	1.5	174.2	-0.4	35.42	1.1	1.5	2.66	0.9	0.9	8.8	69.	-0.3	6.5
16	1.9	176.5	-0.4	28.73	1.1	1.9	1.83	1.2	1.2	8.7	48.	-0.5	6.3
17	2.0	176.9	-0.4	30.70	1.2	2.0	1.76	1.0	0.9	8.5	48.	0.6	6.4
18	2.1	177.4	-0.5	29.33	1.3	2.1	1.76	1.3	1.2	8.5	47.	-1.0	6.5
19	1.7	175.4	-0.5	30.27	1.4	1.7	2.98	0.0	1.2	9.0	61.	-2.4	6.6
20	1.9	176.2	-0.5	26.96	1.4	1.9	2.89	0.0	1.3	8.7	52.	-2.1	6.5
21	1.9	176.2	-0.5	30.11	1.3	1.9	2.85	0.0	1.1	8.8	56.	-1.6	6.8
22	1.6	174.6	-0.4	13.88	1.3	1.6	1.39	0.0	1.1	9.8	69.	-1.1	6.5
23	1.6	174.8	-0.5	35.35	1.4	1.6	1.44	0.0	1.2	9.1	69.	-3.7	6.5
24	1.6	174.8	-0.4	34.50	1.3	1.6	1.35	0.0	1.1	9.5	69.	-2.4	6.8
25	2.0	176.6	-0.4	37.56	2.0	1.5	0.96	0.0	1.8	7.8	68.	-1.1	6.3
26	1.9	176.1	-0.4	33.06	1.9	1.5	0.96	0.0	1.8	8.2	68.	-1.9	6.4
27	1.9	176.4	-0.4	30.84	1.9	1.5	0.89	0.0	1.7	7.8	68.	-1.1	6.3
28	2.6	179.1	-0.6	28.81	2.6	2.5	4.33	2.2	2.1	9.9	46.	-1.3	9.3
29	2.5	178.9	-0.6	39.95	2.5	2.3	4.31	2.1	2.0	4.2	49.	-2.1	8.8
30	2.9	180.0	-0.6	38.95	2.9	2.8	4.31	2.2	2.1	9.0	45.	0.4	9.4
31	2.5	178.6	-0.6	35.14	1.8	2.5	3.15	0.0	1.3	9.4	47.	0.1	9.4
32	2.5	178.6	-0.6	34.03	1.7	2.5	3.29	0.0	1.3	9.5	47.	-1.4	9.4
33	2.4	178.2	-0.6	13.94	1.7	2.4	3.13	0.0	1.4	9.3	46.	-1.9	9.5
34	2.6	179.2	-0.6	23.26	2.6	2.4	0.91	0.0	2.5	7.7	47.	-1.9	9.0
35	2.6	178.9	-0.5	9.64	2.6	2.4	0.93	0.0	2.5	7.7	47.	0.9	9.1
36	2.6	179.1	-0.6	11.55	2.6	2.4	1.05	0.0	2.2	7.9	47.	-2.3	9.2
37	1.5	174.4	-0.4	34.88	1.5	1.4	3.64	1.5	1.4	12.2	64.	-1.8	8.0
38	1.5	174.2	-0.5	23.54	1.5	1.5	3.66	1.4	1.4	12.7	64.	-1.8	8.4
39	1.5	174.4	-0.5	28.30	1.5	1.3	3.65	1.5	1.4	11.8	64.	-1.4	8.3
40	2.3	178.1	-0.5	20.10	1.0	2.3	2.89	1.0	0.9	12.7	52.	-1.6	7.5
41	2.4	178.2	-0.5	20.44	1.2	2.4	2.86	0.9	0.9	10.4	52.	-1.5	7.0
42	2.4	178.4	-0.5	21.94	1.0	2.4	2.84	0.9	0.9	12.8	52.	-1.6	7.6
43	2.2	177.5	-0.4	34.70	2.2	1.8	1.85	2.0	1.9	8.2	51.	-1.0	6.6
44	2.0	176.9	-0.5	31.05	1.6	2.0	3.35	1.3	1.3	10.0	56.	-2.1	7.9
45	1.9	176.4	-0.5	28.27	1.6	1.9	3.34	1.3	1.3	9.3	57.	-2.9	7.2
46	2.0	176.7	-0.5	24.51	1.5	2.0	3.36	1.2	1.2	11.4	62.	-2.6	8.2
47	2.0	176.5	-0.4	18.19	1.5	2.0	1.27	1.4	1.3	9.0	53.	-2.0	7.0
48	2.2	177.5	-0.5	19.14	1.4	2.2	1.27	1.3	1.2	10.7	53.	-1.6	7.1
49	2.0	176.7	-0.5	20.49	1.4	2.0	1.31	1.3	1.3	8.0	53.	-1.3	6.8
50	2.2	177.7	-0.4	29.39	2.2	1.9	0.57	2.0	1.9	8.5	52.	-2.5	6.7
51	2.2	177.6	-0.5	30.85	2.2	1.8	0.94	2.0	2.0	8.2	51.	-2.2	6.5
52	2.2	177.8	-0.5	33.49	2.2	1.8	0.88	2.0	1.9	8.4	53.	-2.1	6.9
53	0.0	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0	0.	0.0	0.0
54	2.6	178.9	-0.6	29.66	2.0	2.6	4.43	1.9	1.9	9.1	46.	0.3	8.7
55	2.7	179.4	-0.5	27.73	2.2	2.7	4.40	1.9	1.8	9.9	45.	-0.2	8.5
56	1.9	176.1	-0.6	37.25	1.8	1.9	2.50	1.6	1.5	9.9	48.	2.1	8.5
57	1.9	176.4	-0.6	14.76	1.9	1.9	2.85	1.6	1.6	10.7	81.	2.3	8.8
58	2.2	177.7	-0.6	35.83	2.0	2.2	2.56	1.7	1.7	9.4	49.	-1.4	8.4
59	2.5	178.8	-0.6	30.46	2.5	2.0	0.60	2.0	2.0	8.5	49.	-0.7	7.9
60	2.4	178.4	-0.5	28.68	2.4	1.9	1.48	2.0	1.9	9.1	47.	-0.4	8.0
61	2.2	177.6	-0.6	28.55	2.2	2.0	0.89	2.0	2.0	9.5	48.	-2.3	7.9

Table 6-24. Gauge 4 - 17 May

M109 TEST 17 MAY 79 ABERDEEN PG

GAUGE 5

SHOT	MAXIMUM PRESSURE PSI	DB	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP MS
1	3.1	180.6	-0.8	24.23	2.7	3.1	5.49	2.3	2.3	9.7	49.	-2.9	10.8
2	3.5	181.6	-0.8	31.99	2.8	3.5	5.50	2.4	2.3	10.3	51.	-2.5	11.2
3	2.8	179.8	-0.7	31.58	2.7	2.8	5.55	2.3	2.2	9.7	54.	-2.1	10.5
4	2.7	179.3	-0.8	16.84	2.7	2.3	3.13	2.1	2.0	11.1	53.	-3.2	10.4
5	2.4	178.4	-0.9	16.98	2.4	2.4	3.00	2.1	2.1	7.6	53.	-3.0	9.4
6	2.6	179.0	-0.7	38.34	2.6	2.4	3.03	2.1	2.0	11.1	54.	0.6	11.0
7	2.8	179.5	-0.7	33.83	2.8	2.6	1.54	2.9	2.7	7.1	53.	-3.7	10.4
8	3.4	181.4	-0.6	31.70	3.4	2.6	1.56	3.2	3.1	7.0	52.	-2.2	9.9
9	2.8	179.6	-0.7	9.35	2.8	2.6	2.25	2.8	2.7	6.8	54.	-2.9	9.9
10	1.7	175.5	-0.5	41.56	1.4	1.7	4.30	1.2	1.2	11.4	56.	-2.8	7.5
11	1.5	174.6	-0.5	39.95	1.5	1.5	4.28	1.2	1.1	10.8	81.	-2.9	7.3
12	1.7	175.4	-0.5	32.75	1.4	1.7	4.22	1.1	1.1	10.6	58.	-2.3	7.6
13	1.6	174.8	-0.5	14.32	1.2	1.6	3.56	1.0	1.0	10.3	79.	-0.7	7.2
14	1.7	175.5	-0.5	34.81	1.1	1.7	3.53	1.0	1.0	11.1	79.	-1.8	7.3
15	1.6	174.8	-0.4	33.58	1.1	1.6	3.51	0.9	0.9	10.7	79.	-1.1	7.1
16	1.6	175.0	-0.4	29.95	1.0	1.6	2.91	0.9	0.9	9.7	77.	-1.0	6.9
17	1.6	174.9	-0.4	34.56	1.1	1.6	3.01	1.0	0.9	9.7	77.	-2.2	7.0
18	1.7	175.2	-0.5	29.55	1.1	1.7	2.96	1.0	0.9	9.6	49.	-1.7	7.1
19	1.9	176.1	-0.5	30.38	1.5	1.9	3.73	0.0	1.2	9.0	57.	-2.9	7.2
20	1.9	176.3	-0.5	38.51	1.5	1.9	3.74	0.0	1.2	9.1	52.	-3.8	7.1
21	1.9	176.5	-0.5	28.10	0.9	1.9	1.69	0.0	0.9	7.7	50.	-1.5	5.3
22	1.5	174.0	-0.4	13.89	1.5	1.5	1.76	0.0	1.1	10.1	83.	-2.4	7.1
23	1.5	174.3	-0.5	33.14	1.5	1.5	2.29	0.0	1.1	10.0	79.	-2.0	7.3
24	1.6	174.6	-0.4	31.95	1.6	1.5	1.81	0.0	1.2	10.0	103.	-2.2	7.5
25	1.9	176.1	-0.4	31.84	1.9	1.6	0.54	0.0	1.6	8.6	77.	-1.9	6.8
26	1.9	176.4	-0.5	32.69	1.9	1.5	0.57	0.0	1.6	8.6	51.	-1.6	6.9
27	1.9	176.2	-0.5	30.75	1.9	1.5	0.57	0.0	1.6	8.2	48.	-2.4	6.7
28	3.1	180.6	-0.7	38.74	3.1	2.3	0.75	0.0	2.7	5.8	48.	-3.3	6.4
29	3.6	181.8	-0.8	38.99	3.6	2.5	0.55	0.0	2.8	5.7	47.	-3.0	6.4
30	3.4	181.4	-0.8	38.30	3.4	2.4	0.59	0.0	2.8	10.4	48.	-3.5	10.1
31	3.1	180.6	-0.7	36.17	1.6	3.1	5.94	0.0	1.2	10.4	49.	-1.0	11.4
32	3.2	180.8	-0.8	35.95	1.4	3.2	5.94	0.0	1.1	10.2	52.	-3.8	11.3
33	3.1	180.6	-0.8	36.39	1.5	3.1	5.83	0.0	1.4	10.2	46.	-1.3	11.5
34	2.8	179.6	-0.6	42.67	2.7	2.8	1.09	0.0	2.6	8.1	49.	-1.0	10.8
35	2.9	179.9	-0.7	10.65	2.9	2.6	1.21	0.0	2.8	7.6	48.	-2.2	10.2
36	2.9	179.9	-0.7	29.91	2.8	2.9	1.25	0.0	2.5	8.2	48.	-1.1	10.9
37	1.7	175.1	-0.4	29.16	1.7	1.3	5.81	1.4	1.3	14.0	65.	-2.0	9.5
38	1.6	174.8	-0.6	28.70	1.6	1.4	8.16	1.5	1.4	12.5	65.	-3.7	9.3
39	1.7	175.6	-0.6	30.43	1.7	1.3	5.01	1.5	1.4	13.1	65.	-2.8	9.5
40	1.9	176.5	-0.5	20.98	1.1	1.9	3.66	1.0	1.0	13.6	62.	-2.4	8.6
41	2.1	177.3	-0.5	20.55	1.0	2.1	3.64	1.0	1.0	10.5	62.	-2.2	7.8
42	1.9	176.5	-0.6	21.81	1.0	1.9	3.70	1.0	1.0	13.5	62.	-1.2	8.6
43	1.8	176.0	-0.5	31.84	1.6	1.8	1.80	1.7	1.5	8.3	60.	-1.6	7.4
44	2.2	177.4	-0.6	27.04	1.7	2.2	4.14	1.4	1.4	10.0	65.	-2.8	9.0
45	1.9	176.2	-0.6	29.81	1.6	1.9	4.26	1.5	1.4	10.7	55.	-3.2	8.5
46	2.1	177.1	-0.6	27.21	1.6	2.1	4.16	1.3	1.3	11.3	65.	-2.8	9.4
47	2.0	176.8	-0.5	19.39	1.6	2.0	1.66	1.3	1.3	9.0	62.	-2.5	8.0
48	2.2	177.4	-0.5	34.19	1.6	2.2	1.69	1.4	1.3	9.3	62.	-2.5	7.9
49	2.0	176.7	-0.5	19.08	1.6	2.0	1.73	1.3	1.3	9.3	63.	-2.6	7.8
50	2.8	179.8	-0.6	29.10	2.8	2.0	0.56	2.2	2.1	8.3	47.	-2.0	7.5
51	2.7	179.4	-0.5	30.19	2.7	2.0	0.56	2.2	2.0	8.4	47.	-3.3	7.4
52	2.4	178.5	-0.5	31.50	2.4	2.1	0.66	2.2	2.2	8.4	47.	-1.7	7.8
53	3.3	181.1	-0.7	40.80	3.3	2.5	0.59	2.8	2.8	5.7	47.	-2.0	6.6
54	3.2	180.9	-0.8	26.30	3.2	2.3	0.78	2.8	2.7	5.9	48.	-1.9	6.8
55	3.3	181.2	-0.7	40.98	3.3	2.5	0.86	2.8	2.7	5.7	47.	-3.6	6.7
56	2.3	178.1	-0.9	38.01	2.3	2.3	4.59	1.8	1.7	11.2	50.	-0.5	12.0
57	2.6	179.0	-0.8	38.61	2.4	2.6	4.56	1.8	1.7	11.1	51.	-1.4	12.4
58	2.4	178.4	-0.8	36.44	2.4	2.2	4.40	1.8	1.7	11.2	51.	-2.3	12.3
59	3.0	180.2	-0.7	31.08	2.5	3.0	1.13	3.1	2.5	8.7	48.	-1.2	11.1
60	3.0	180.2	-0.7	40.14	2.5	3.0	1.13	3.1	2.6	9.6	48.	-1.8	11.4
61	3.1	180.6	-0.7	26.43	2.3	3.1	1.16	3.4	2.6	9.5	48.	-1.7	11.5

Table 6-25. Gauge 5 - 17 May

M109 TEST 17 MAY 79 ABERDEEN PG

GAUGE 6

SHOT	MAXIMUM PRESSURE PSI	DR	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	2.8	179.7	-1.0	35.36	2.8	2.6	1.05	1.9	1.6	5.5	65.	-0.9	7.1
2	3.0	180.3	-1.1	32.61	3.0	2.5	0.93	2.3	2.0	5.3	62.	-1.8	7.0
3	3.1	180.5	-1.0	35.23	3.1	2.6	0.79	2.2	2.0	4.9	63.	-1.5	6.7
4	2.8	179.5	-0.9	35.80	2.8	1.6	0.93	2.0	1.7	10.7	62.	-3.3	9.0
5	2.3	178.1	-0.9	21.79	2.3	1.9	0.64	2.1	1.8	10.4	69.	-1.9	9.0
6	2.6	178.9	-0.9	36.41	2.6	1.8	0.65	2.4	2.1	10.5	66.	-3.4	9.2
7	2.2	177.6	-0.9	43.83	2.1	2.2	3.00	2.0	1.7	9.8	76.	-0.1	10.5
8	2.2	177.8	-1.0	36.42	2.2	2.2	2.90	2.0	1.7	9.3	62.	-2.1	10.1
9	2.1	177.1	-0.8	33.48	2.0	2.1	2.98	1.9	1.7	9.2	64.	-1.0	10.3
10	1.9	176.1	-0.6	42.70	1.9	1.6	5.89	1.5	1.4	5.8	62.	-2.6	9.0
11	1.7	175.5	-0.6	41.24	1.7	1.4	5.93	1.5	1.3	5.8	59.	-1.9	8.8
12	1.7	175.5	-0.5	36.05	1.7	1.3	0.93	1.5	1.3	5.7	61.	-1.1	4.6
13	1.8	175.6	-0.6	38.64	1.8	1.3	6.49	1.6	1.3	11.3	54.	0.4	8.6
14	1.8	176.0	-0.6	38.19	1.8	1.4	5.30	1.4	1.3	11.3	57.	0.4	8.7
15	1.6	174.7	-0.5	34.88	1.6	1.3	5.24	1.4	1.2	11.2	56.	0.9	8.5
16	1.5	174.3	-0.5	31.01	0.9	1.5	2.30	0.8	0.7	9.8	56.	0.2	7.8
17	1.7	175.2	-0.5	27.91	1.0	1.7	2.05	0.9	0.7	9.9	51.	-1.4	8.1
18	1.5	174.5	-0.6	29.64	1.0	1.5	2.00	0.9	0.7	9.7	88.	-2.8	8.0
19	2.8	179.5	-0.7	14.40	2.7	2.8	4.46	0.0	2.0	8.8	52.	-3.7	8.4
20	2.6	179.0	-0.6	39.01	2.6	2.4	4.46	0.0	1.8	4.4	54.	-4.1	8.3
21	2.8	179.6	-0.6	33.36	2.5	2.8	4.39	0.0	1.8	4.3	50.	-2.4	4.7
22	2.2	177.6	-0.6	14.05	2.2	1.9	2.46	0.0	1.5	10.7	51.	0.3	8.8
23	2.3	177.9	-0.6	35.56	2.3	2.0	2.44	0.0	1.5	9.7	52.	-0.1	8.9
24	2.3	177.8	-0.6	34.13	2.3	1.8	2.40	0.0	1.6	10.1	53.	-2.0	9.2
25	3.0	180.4	-0.5	32.03	3.0	2.2	0.80	0.0	2.3	8.6	47.	-3.2	8.3
26	2.8	179.6	-0.5	32.34	2.8	2.0	0.96	0.0	2.2	8.6	50.	-2.4	8.3
27	2.5	178.8	-0.6	30.24	2.5	2.0	0.88	0.0	2.2	8.8	48.	-0.5	8.2
28	3.7	182.1	-0.9	38.28	3.7	2.5	0.84	0.0	3.1	5.5	47.	-5.0	7.1
29	3.8	182.3	-0.8	38.58	3.8	2.6	0.84	0.0	3.1	5.6	52.	-3.3	7.2
30	3.7	182.1	-0.8	38.17	3.7	2.6	0.86	0.0	2.6	10.7	48.	-2.7	10.7
31	2.2	177.5	-0.8	36.16	2.1	2.2	6.64	0.0	2.2	10.6	56.	-0.8	12.5
32	2.0	176.6	-0.8	35.88	1.9	2.0	6.64	0.0	2.0	10.6	58.	-0.3	12.4
33	2.1	177.1	-0.8	35.48	2.0	2.1	6.53	0.0	2.2	10.7	58.	-2.3	12.4
34	3.6	181.8	-0.7	11.85	2.1	3.6	1.48	0.0	1.4	8.5	49.	1.3	11.5
35	3.7	182.2	-0.8	10.89	1.6	3.7	1.54	0.0	1.3	8.3	49.	-2.1	11.3
36	3.7	182.2	-0.8	29.75	2.2	3.7	1.40	0.0	1.0	8.5	47.	-0.4	11.5
37	1.8	176.0	-0.7	33.53	1.8	1.8	0.94	1.4	1.2	10.7	78.	-4.9	9.8
38	2.1	177.2	-0.7	32.36	2.1	2.0	0.94	1.4	1.3	10.7	62.	-2.8	10.0
39	2.2	177.8	-0.7	32.84	2.2	1.9	0.94	1.8	1.6	10.7	59.	-2.1	9.9
40	1.5	174.2	-0.6	22.89	1.5	1.4	6.51	1.5	1.3	11.5	89.	-2.2	9.5
41	1.8	175.9	-0.5	32.14	1.8	1.5	3.46	1.6	1.4	11.4	77.	-0.9	9.4
42	1.6	174.7	-0.7	22.81	1.6	1.5	5.71	1.7	1.5	11.7	97.	-1.6	9.5
43	2.1	177.3	-0.6	32.94	2.0	2.1	2.03	1.9	1.7	8.1	75.	-0.2	8.4
44	3.0	180.2	-0.7	27.25	2.8	3.0	4.91	2.3	2.0	10.2	51.	-2.3	11.1
45	2.8	179.8	-0.8	29.81	2.8	2.8	4.90	2.3	2.0	4.8	52.	-5.0	5.3
46	2.9	179.9	-0.8	27.61	2.7	2.9	4.94	2.1	1.8	10.8	49.	-3.7	11.5
47	2.5	178.8	-0.7	32.09	2.4	2.5	2.31	2.0	1.7	8.2	50.	-5.4	9.6
48	2.8	179.6	-0.7	32.26	2.8	2.7	2.35	2.4	2.1	8.4	48.	-5.5	9.6
49	2.6	179.1	-0.6	19.04	2.6	2.5	2.36	2.2	1.9	8.2	48.	-3.0	9.7
50	3.7	182.1	-0.7	30.10	3.7	2.9	0.80	3.1	2.7	7.0	46.	-2.5	9.3
51	3.8	182.3	-0.6	29.89	3.8	2.9	0.94	3.2	3.0	6.8	47.	-2.2	9.1
52	3.7	182.2	-0.7	32.23	3.7	2.9	0.80	3.2	2.9	7.0	46.	-3.4	9.6
53	4.0	182.7	-0.9	25.18	4.0	2.9	0.69	3.6	3.2	5.6	49.	-8.9	7.5
54	3.6	181.8	-0.9	29.66	3.6	3.0	0.80	3.2	2.9	5.8	49.	-8.4	7.6
55	3.8	182.4	-0.9	29.69	3.8	2.9	0.80	3.5	3.0	5.4	49.	-8.9	7.8
56	3.5	181.6	-0.9	37.79	3.5	2.5	0.66	3.0	2.6	10.5	48.	-6.3	11.6
57	3.7	182.1	-0.8	38.74	3.7	2.7	3.42	3.0	2.6	12.5	51.	-9.9	12.5
58	3.8	182.4	-0.9	38.20	3.8	3.6	3.40	3.2	2.8	10.5	48.	-7.7	11.8
59	3.9	182.6	-0.9	30.39	3.9	3.1	0.91	2.9	2.6	6.9	49.	-4.8	11.2
60	3.8	182.3	-0.9	30.06	3.8	3.1	0.79	3.5	3.2	7.0	51.	-7.1	11.2
61	3.7	182.2	-1.0	30.27	3.7	3.2	1.05	3.0	2.7	6.9	51.	-9.6	11.3

Table 6-26. Gauge 6 - 17 May

M109 TEST 17 MAY 79 ABERDEEN PG

GAUGE 7

SHOT	MAXIMUM PRESSURE PSI	DB	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	2.7	179.2	-0.9	25.86	2.7	2.6	0.65	2.3	2.2	5.3	61.	-6.1	6.7
2	3.0	180.1	-0.9	36.25	3.0	2.7	1.85	2.5	2.4	5.7	63.	-6.6	6.8
3	2.7	179.4	-0.9	39.61	2.7	2.6	0.61	2.5	2.3	5.3	63.	-7.0	6.5
4	2.1	177.0	-1.0	11.95	2.0	2.1	6.75	2.4	2.3	10.6	67.	0.2	12.4
5	2.0	176.8	-1.1	15.31	1.9	2.0	6.70	2.2	2.0	0.0	69.	-6.5	4.6
6	2.1	177.2	-0.9	36.90	2.0	2.1	6.56	2.3	2.1	10.7	67.	0.6	12.7
7	2.9	180.0	-0.9	23.85	1.7	2.9	1.84	0.3	-0.4	8.4	62.	-2.4	10.9
8	3.1	180.5	-0.9	30.99	2.4	3.1	1.69	2.4	1.8	7.9	61.	-0.2	11.0
9	3.1	180.5	-0.9	29.68	1.6	3.1	1.60	1.6	1.2	8.0	62.	0.8	11.2
10	1.6	175.1	-0.5	39.41	1.6	1.5	3.23	1.5	1.4	10.7	56.	0.2	6.6
11	1.5	174.3	-0.5	36.86	1.4	1.5	2.95	1.3	1.3	10.5	77.	0.6	6.6
12	1.6	174.6	-0.4	34.34	1.6	1.5	2.88	1.4	1.3	11.4	77.	0.6	6.7
13	1.3	173.2	-0.5	36.49	1.1	1.3	2.31	1.0	1.0	9.7	75.	0.2	6.7
14	1.3	172.8	-0.5	37.79	1.1	1.3	2.23	1.0	1.0	9.6	75.	-1.8	6.8
15	1.4	173.4	-0.4	38.19	1.1	1.4	2.46	1.0	0.9	9.6	75.	-1.6	6.8
16	1.4	173.9	-0.4	34.11	1.4	1.4	0.98	1.5	1.5	8.7	73.	1.4	6.5
17	1.5	174.1	-0.4	34.98	1.5	1.4	1.15	1.5	1.5	8.4	73.	2.8	6.6
18	1.5	174.0	-0.5	30.19	1.5	1.4	1.25	1.5	1.5	8.3	72.	-5.8	6.5
19	1.8	175.7	-0.5	31.60	1.4	1.8	2.83	0.0	1.2	8.3	57.	-0.6	6.8
20	1.8	175.8	-0.5	30.75	1.5	1.8	2.80	0.0	1.3	9.0	53.	-0.6	6.8
21	1.8	175.9	-0.5	27.83	1.3	1.8	2.78	0.0	1.3	8.8	58.	-1.5	7.1
22	1.6	174.9	-0.5	13.46	1.3	1.6	1.89	0.0	1.1	9.7	75.	-0.7	7.0
23	1.6	174.9	-0.5	34.90	1.3	1.6	1.81	0.0	1.1	9.2	75.	-0.4	7.0
24	1.7	175.4	-0.4	34.25	1.3	1.7	1.85	0.0	1.1	9.5	75.	0.1	7.2
25	2.0	176.8	-0.4	37.90	2.0	1.8	0.63	0.0	1.8	8.4	73.	2.5	6.7
26	2.1	177.1	-0.5	34.74	2.1	1.8	0.64	0.0	1.8	8.3	73.	0.5	6.9
27	2.1	177.1	-0.5	31.21	2.1	1.8	0.63	0.0	1.9	8.1	73.	2.0	6.8
28	2.6	179.1	-0.8	28.84	2.6	2.5	4.79	0.0	2.4	9.1	56.	-2.5	10.5
29	2.7	179.4	-0.7	38.05	2.7	2.5	4.89	0.0	2.5	10.0	55.	-4.4	10.5
30	2.6	179.1	-0.8	32.86	2.6	2.4	4.81	0.0	2.3	10.9	56.	-1.1	11.0
31	2.7	179.2	-0.7	33.67	2.7	2.1	2.56	0.0	2.3	10.4	55.	-2.4	10.9
32	2.5	178.7	-0.7	35.96	2.5	2.2	2.41	0.0	2.2	9.8	55.	-4.1	10.6
33	2.4	178.3	-0.8	36.03	2.4	2.2	3.31	0.0	2.2	10.0	57.	-4.4	10.5
34	2.7	179.2	-0.8	29.84	2.7	2.4	1.19	0.0	2.7	7.7	51.	1.8	9.5
35	2.9	179.9	-0.7	26.30	2.9	2.9	0.60	0.0	2.5	7.8	51.	-0.9	9.7
36	2.9	180.1	-0.8	27.31	2.9	2.4	1.15	0.0	3.0	7.8	49.	0.9	9.8
37	1.3	173.2	-0.4	36.65	1.3	1.2	3.48	1.2	1.2	12.8	62.	-0.7	7.3
38	1.5	174.3	-0.5	32.74	1.5	1.3	3.49	1.4	1.4	13.2	62.	-0.6	8.0
39	1.6	174.8	-0.5	27.16	1.6	1.5	3.79	1.5	1.5	12.8	62.	0.3	8.1
40	1.6	174.9	-0.4	19.98	1.0	1.6	2.51	1.0	1.0	12.5	57.	-0.4	7.4
41	1.4	173.9	-0.4	20.61	1.1	1.4	2.61	1.1	1.1	10.1	58.	-1.7	6.6
42	1.6	174.6	-0.4	20.23	1.0	1.6	2.59	1.1	1.0	12.6	58.	-1.6	7.2
43	1.7	175.6	-0.4	31.52	1.7	1.7	1.66	1.5	1.5	8.7	55.	-0.7	6.3
44	1.6	174.8	-0.5	27.38	1.4	1.6	3.17	1.3	1.3	9.9	62.	-2.0	7.4
45	1.5	174.3	-0.5	30.10	1.4	1.5	3.15	1.3	1.3	9.3	63.	-2.3	7.0
46	1.6	174.7	-0.5	31.24	1.3	1.6	3.20	1.2	1.2	9.6	61.	0.2	7.5
47	1.7	175.4	-0.5	19.08	1.3	1.7	1.02	1.2	1.2	11.0	62.	-0.2	6.8
48	1.7	175.3	-0.4	32.92	1.6	1.7	1.06	1.8	1.7	9.3	62.	0.7	6.5
49	1.6	175.0	-0.6	18.95	1.4	1.6	1.08	1.3	1.2	8.3	58.	0.9	6.4
50	2.0	176.8	-0.4	30.29	2.0	1.7	0.57	1.9	1.8	8.0	56.	-1.6	6.3
51	1.9	176.3	-0.4	30.01	1.9	1.6	0.65	1.8	1.8	8.1	62.	-0.5	6.1
52	1.9	176.3	-0.4	30.99	1.9	1.7	0.60	1.8	1.7	7.9	57.	-0.7	6.4
53	3.1	180.5	-0.8	29.39	3.1	2.6	0.90	2.9	2.8	5.3	52.	-3.6	7.5
54	3.0	180.3	-0.8	23.80	3.0	2.7	0.89	3.1	3.0	5.8	55.	-2.8	7.4
55	3.2	180.9	-0.8	23.84	3.2	2.5	0.60	3.2	3.1	5.3	53.	-6.5	7.2
56	3.0	180.2	-0.7	36.65	3.0	2.2	0.54	2.9	2.9	10.3	52.	-2.8	11.4
57	2.8	179.8	-0.8	36.95	2.8	1.9	0.78	2.9	2.8	10.6	48.	-4.3	11.1
58	3.0	180.2	-0.7	35.98	3.0	2.2	0.57	2.9	2.9	10.4	52.	-3.5	11.3
59	2.7	179.3	-0.6	35.71	1.8	2.7	2.96	1.6	1.5	9.1	55.	-5.5	10.2
60	2.5	178.8	-0.7	40.35	1.7	2.5	2.26	1.5	1.4	9.4	56.	-6.2	10.2
61	2.8	179.8	-0.7	29.00	1.6	2.8	2.35	1.5	1.4	10.3	52.	-1.9	10.8

Table 6-27. Gauge 7 - 17 May

M109 TEST 17 MAY 79 ABERDEEN PG

GAUGE 8

SHOT	MAXIMUM PRESSURE PSI	DB	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	1.3	172.9	-1.6	41.36	1.3	0.9	2.91	1.3	1.3	0.9	0.	-2.7	0.9
2	1.3	173.0	-2.0	44.75	1.3	1.1	0.53	1.2	1.2	1.0	140.	-26.5	0.9
3	1.5	174.2	-1.6	41.15	1.5	1.1	0.53	1.3	1.3	1.0	153.	-5.1	0.9
4	1.0	170.8	-1.8	17.19	1.0	0.9	2.01	1.0	0.9	4.5	146.	-31.0	2.6
5	3.0	180.2	-2.6	12.79	3.0	2.0	0.53	2.9	2.9	6.9	85.	-22.1	11.3
6	3.4	181.3	-2.1	13.26	3.4	2.1	0.63	3.0	2.9	6.8	86.	-28.0	11.6
7	3.1	180.6	-1.7	13.13	3.1	2.2	2.74	2.8	2.8	7.0	66.	-15.3	10.1
8	2.9	179.9	-1.9	13.26	2.9	2.0	5.19	2.7	2.7	7.7	82.	-15.9	11.5
9	2.2	177.4	-1.6	42.09	2.2	1.2	5.05	1.9	1.6	0.9	92.	-8.3	2.1
10	1.3	173.1	-0.6	42.83	1.3	1.0	3.89	1.3	1 2	10.9	86.	-4.1	6.1
11	1.3	173.0	-0.6	42.26	1.3	1.0	3.92	1.2	1.2	10.7	86.	-3.7	5.9
12	1.3	172.9	-0.5	41.56	1.3	1.0	3.84	1.2	1.2	9.6	86.	-4.1	5.9
13	1.1	172.0	-0.5	37.86	1.1	1.0	2.92	1.0	1.0	10.3	84.	-2.4	6.1
14	1.1	171.5	-0.5	37.48	1.1	1.0	2.92	1.0	1.0	10.5	84.	-3.5	6.2
15	1.1	171.7	-0.5	32.46	1.1	1.0	2.88	1.0	1.0	10.5	84.	-2.5	6.2
16	1.1	171.9	-0.4	34.17	1.1	0.9	0.91	1.2	1.1	9.5	82.	-2.1	5.5
17	1.1	172.0	-0.5	34.33	1.1	0.9	0.89	1.1	1.1	8.9	82.	-4.1	5.4
18	1.1	171.8	-0.4	32.10	1.1	0.9	0.90	1.2	1.1	9.3	82.	-3.0	5.5
19	1.3	172.7	-0.5	31.24	1.3	1.0	3.49	0.0	1.1	9.4	86.	-3.5	5.8
20	1.3	173.0	-0.5	39.83	1.3	1.0	3.48	0.0	1.2	8.4	86.	-4.9	5.7
21	1.3	173.0	-0.5	41.08	1.3	1.0	3.40	0.0	1.2	9.0	86.	-4.7	6.0
22	1.3	173.2	-0.5	13.31	1.3	1.0	2.13	0.0	1.1	8.9	83.	-3.5	6.1
23	1.3	172.8	-0.5	35.21	1.3	1.0	2.10	0.0	1.1	8.9	83.	-5.1	6.0
24	1.2	172.6	-0.5	34.84	1.2	1.0	2.15	0.0	1.1	9.6	84.	-4.8	6.1
25	1.4	173.9	-0.4	12.54	1.4	1.0	0.60	0.0	1.3	8.0	82.	-4.9	5.1
26	1.4	173.7	-0.5	13.29	1.4	1.0	0.74	0.0	1.3	8.0	82.	-4.1	5.2
27	1.4	173.4	-0.6	30.59	1.4	1.0	0.57	0.0	1.3	7.8	82.	-4.9	5.0
28	1.3	173.2	-0.6	31.15	1.3	1.1	3.78	0.0	1.3	9.5	62.	-5.9	6.2
29	1.4	173.4	-0.7	32.51	1.4	1.1	3.76	0.0	1.3	8.1	63.	-5.4	5.8
30	1.4	173.5	-0.6	40.66	1.4	1.1	3.88	0.0	1.3	8.1	61.	-5.7	5.9
31	1.3	172.7	-0.6	36.29	1.3	1.1	2.78	0.0	1.1	9.2	60.	-3.1	6.5
32	1.2	172.0	-0.6	34.81	1.2	1.0	2.79	0.0	1.0	9.2	95.	-4.9	6.4
33	1.2	172.3	-0.6	35.36	1.2	1.1	2.79	0.0	1.0	9.5	95.	-5.8	6.4
34	1.4	173.6	-0.5	10.09	1.4	1.0	0.60	0.0	1.4	7.1	59.	-6.0	5.0
35	1.4	173.9	-0.5	10.05	1.4	1.1	0.53	0.0	1.4	7.3	59.	-5.6	5.0
36	1.4	173.5	-0.6	29.36	1.4	1.0	0.66	0.0	1.4	7.3	60.	-6.0	5.1
37	1.3	173.0	-0.5	33.99	1.3	1.0	4.29	1.2	1.2	14.2	67.	-3.7	7.7
38	1.3	173.2	-0.6	28.81	1.3	1.1	4.26	1.3	1.2	14.2	81.	-4.2	7.9
39	1.4	173.5	-0.5	26.70	1.4	1.1	4.20	1.3	1.3	13.4	67.	-4.9	7.5
40	1.0	171.1	-0.4	30.27	1.0	1.0	3.13	1.0	1.0	12.9	79.	-3.3	7.0
41	1.1	171.3	-0.4	40.24	1.0	1.1	3.25	1.0	1.0	13.1	71.	-3.5	6.8
42	1.1	171.3	-0.4	39.71	1.0	1.1	3.14	1.1	1.0	12.9	79.	-3.9	7.0
43	1.5	174.1	-0.5	28.00	1.5	1.0	0.51	1.4	1.3	8.9	66.	-5.1	5.5
44	1.3	173.2	-0.5	29.58	1.3	1.1	3.91	1.3	1.2	10.4	72.	-5.3	6.7
45	1.3	173.2	-0.5	29.59	1.3	1.1	3.84	1.3	1.2	9.1	73.	-5.8	6.3
46	1.3	172.9	-0.6	27.45	1.3	1.1	3.94	1.2	1.2	10.1	80.	-5.5	6.7
47	1.3	173.2	-0.5	19.21	1.3	1.0	1.56	1.3	1.2	11.4	69.	-5.3	6.2
48	1.3	172.7	-0.5	35.60	1.3	1.0	0.53	1.2	1.2	9.5	70.	-3.7	5.6
49	1.3	173.2	-0.6	18.89	1.3	1.0	1.60	1.2	1.2	9.0	70.	-5.4	5.5
50	1.4	173.7	-0.5	29.85	1.4	1.0	0.55	1.4	1.4	8.2	68.	-4.6	5.0
51	1.4	173.8	-0.5	31.31	1.4	1.0	0.57	1.4	1.3	8.2	67.	-5.2	5.0
52	1.4	173.7	-0.5	32.67	1.4	1.0	0.59	1.4	1.4	8.2	64.	-4.9	5.1
53	1.4	173.8	-0.7	32.54	1.4	1.1	6.01	1.4	1.3	9.1	62.	-5.6	6.0
54	1.4	173.9	-0.7	32.75	1.4	1.0	4.74	1.4	1.3	10.4	63.	-6.9	6.5
55	1.4	173.9	-0.6	32.20	1.4	1.1	4.76	1.4	1.4	10.6	61.	-5.9	6.3
56	1.3	172.8	-0.7	37.60	1.3	1.1	3.76	1.2	1.1	9.6	94.	-4.9	6.7
57	1.3	172.8	-0.7	36.29	1.3	1.1	3.78	1.2	1.2	9.3	63.	-4.8	6.8
58	1.3	173.2	-0.6	37.71	1.3	1.1	3.76	1.2	1.2	10.0	94.	-4.8	7.0
59	1.1	171.6	-0.5	33.71	1.1	0.9	1.69	1.2	1.2	8.1	92.	-5.5	5.6
60	1.1	171.7	-0.5	32.28	1.1	0.9	1.90	1.2	1.2	8.0	92.	-6.2	5.5
61	1.1	171.6	-0.6	32.74	1.1	0.9	1.66	1.2	1.2	8.0	92.	-6.4	5.6

Table 6-28. Gauge 8 - 17 May

M109 TEST 17 MAY 79 ABERDEEN PG

GAUGE 9

SHOT	MAXIMUM PRESSURE PSI	DR	MIN PSI	TIME MIN MS	INIT REFL MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	1.6	174.9	-1.0	29.38	1.5	1.6	2,24	1.6	1.5	11,9	105.	-2.5	10.1
2	1.7	175.3	-0.8	28.49	1.6	1.7	8,53	1.8	1.7	11,5	119.	1.6	10.5
3	1.7	175.1	-0.8	41.15	1.6	1.7	2,05	1.8	1.7	11,4	78.	-0.1	10.0
4	1.4	173.6	-0.7	45.66	1.1	1.4	1,95	1.1	1.0	11.3	120.	-0.4	8.4
5	1.4	173.8	-0.7	27.68	1.0	1.4	1,98	1.0	1.0	11,4	101.	1.7	8.2
6	1.4	173.7	-0.7	27.54	1.1	1.4	1,98	1.1	1.0	11.3	101.	-2.8	8.6
7	1.8	175.7	-0.7	34.53	1.1	1.8	2,42	1.2	1.1	11,6	111.	-0.8	8.0
8	1.7	175.4	-0.7	41.06	1.1	1.7	2,55	1.3	1.1	11.7	71.	-0.6	7.9
9	1.6	175.1	-0.7	41.00	1.1	1.6	2,53	1.0	1.0	11,8	88.	-0.2	8.0
10	1.9	176.3	-0.6	39.08	1.9	1.5	0,90	1.6	1.5	10,7	62.	-2.1	7.5
11	1.8	175.8	-0.6	41.96	1.8	1.5	0,94	1.5	1.5	10,7	57.	-1.1	7.4
12	1.7	175.4	-0.5	39.06	1.7	1.5	0,93	1.5	1.4	10,1	61.	-0.3	7.5
13	1.7	175.3	-0.6	35.69	1.7	1.3	4,55	1.4	1.3	10,2	56.	0.8	7.7
14	1.8	175.9	-0.6	36.88	1.8	1.3	5,97	1.4	1.3	10,3	57.	1.5	7.8
15	1.5	174.0	-0.6	32.26	1.5	1.4	4,51	1.3	1.2	10,0	59.	-3.8	7.5
16	1.7	175.6	-0.6	29.33	1.7	1.5	1,63	2.2	1.9	8,6	55.	-3.7	7.0
17	1.8	175.7	-0.5	33.00	1.8	1.5	1,73	1.9	1.8	8,4	50.	-1.3	7.4
18	1.8	175.9	-0.5	29.33	1.8	1.5	1,48	2.0	1.7	8,5	50.	1.6	7.5
19	2.2	177.7	-0.6	37.69	2.2	1.9	4,39	0.0	1.8	8,8	51.	-1.4	7.9
20	2.2	177.6	-0.6	41.51	2.2	1.8	4,55	0.0	1.9	8,7	50.	-1.1	7.9
21	2.0	176.6	-0.5	35.29	2.0	1.9	4,54	0.0	1.8	8,7	57.	-1.7	8.1
22	1.8	175.8	-0.6	14.09	1.8	1.7	2,74	0.0	1.5	9,6	52.	-0.4	8.1
23	1.9	176.4	-0.6	34.30	1.9	1.6	2,84	0.0	1.5	9,0	53.	-1.6	8.4
24	1.7	175.3	-0.6	34.84	1.7	1.6	2,64	0.0	1.4	9,4	55.	-3.0	8.6
25	2.8	179.8	-0.4	25.90	2.8	2.1	0,64	0.0	2.2	8,0	46.	0.1	8.0
26	2.2	177.4	-0.5	13.04	2.2	2.0	0,84	0.0	2.2	8,1	50.	0.5	8.1
27	2.2	177.6	-0.6	30.34	2.2	2.0	0,95	0.0	2.1	7,8	48.	-4.6	7.8
28	2.1	177.1	-0.7	31.50	2.1	1.9	4,66	2.0	1.9	9.8	56.	-3.7	8.5
29	2.3	178.0	-0.7	32.66	2.3	1.9	0,59	0.0	2.0	8,5	60.	-3.0	7.9
30	2.3	178.0	-0.6	33.51	2.3	2.3	4,70	0.0	1.9	8,8	57.	-2.5	8.3
31	1.8	175.8	-0.7	14.35	1.5	1.8	3,36	0.0	1.3	9,3	56.	-2.6	8.5
32	1.8	176.0	-0.6	34.98	1.5	1.8	3,65	0.0	1.2	9,2	55.	-1.9	8.6
33	1.8	176.0	-0.6	14.57	1.6	1.8	3,85	0.0	1.3	9,4	56.	-6.1	8.6
34	2.3	177.8	-0.5	11.18	2.3	2.2	0,98	0.0	2.1	7,5	48.	-0.7	8.2
35	2.6	178.9	-0.6	11.74	2.6	2.3	0,95	0.0	2.5	7,4	47.	0.2	8.3
36	2.6	178.9	-0.6	30.20	2.6	2.2	0,90	0.0	2.3	7,5	47.	-0.3	8.4
37	2.1	177.1	-0.6	32.88	2.1	1.6	6,14	1.8	1.8	15,1	55.	-3.4	9.8
38	2.1	177.3	-0.7	31.94	2.1	1.7	6,04	1.9	1.8	15,3	80.	-1.4	10.2
39	2.4	178.3	-0.6	29.34	2.4	2.3	6,01	2.0	2.0	14,8	56.	-0.5	9.8
40	1.3	173.3	-0.5	33.26	1.3	1.3	3,17	1.4	1.3	13,0	79.	-1.0	8.8
41	1.5	174.1	-0.5	31.84	1.5	1.3	3,24	1.4	1.3	12,6	79.	-1.4	8.6
42	1.5	174.4	-0.5	34.98	1.5	1.3	5,70	1.5	1.4	13,2	79.	-2.5	8.9
43	2.6	179.0	-0.6	29.95	2.6	1.6	0,82	2.8	2.7	9,1	50.	0.5	7.4
44	2.7	179.4	-0.6	26.43	2.5	2.7	5,09	2.1	2.0	10,8	51.	-2.0	9.6
45	2.3	178.2	-0.6	30.63	2.3	2.3	5,05	2.1	2.0	9,4	52.	-3.5	9.1
46	2.6	179.0	-0.7	30.48	2.2	2.6	5,08	1.9	1.9	9,8	49.	-2.7	9.8
47	2.0	176.9	-0.6	33.14	2.0	2.0	2,46	1.9	1.9	11,5	79.	-2.5	9.3
48	2.1	177.3	-0.6	35.06	2.1	2.1	2,48	1.8	1.7	8,4	79.	-3.6	8.5
49	2.4	178.2	-0.7	18.38	2.3	2.4	2,88	2.0	2.0	8,4	79.	-1.8	8.5
50	3.3	181.2	-0.6	30.05	3.3	2.4	0,60	2.8	2.7	6,5	46.	-1.2	8.2
51	3.1	180.5	-0.6	29.79	3.1	2.3	0,57	2.6	2.5	6,8	47.	-1.5	8.2
52	3.3	181.2	-0.6	29.69	3.3	2.5	1,13	2.8	2.7	7,2	45.	-3.5	8.5
53	3.4	181.4	-0.8	39.58	3.4	3.0	0,63	2.9	2.8	6,2	49.	-2.8	7.1
54	3.0	180.3	-0.8	36.28	3.0	2.6	0.64	2.8	2.7	5,7	53.	-2.5	7.1
55	3.2	180.9	-0.8	40.64	3.2	2.8	0,76	2.8	2.7	5,7	52.	-3.7	7.1
56	2.3	178.1	-0.9	37.49	2.3	1.6	1,01	2.7	2.5	10,8	54.	-2.5	11.8
57	2.4	178.3	-0.8	35.30	2.4	1.7	0,99	2.6	2.5	10,8	51.	-2.6	11.8
58	2.5	178.8	-0.8	35.88	2.5	1.8	1,11	2.8	2.7	10,9	51.	-2.4	11.9
59	3.1	180.6	-0.8	11.48	2.5	3.1	1,01	4.2	3.6	6,9	48.	-3.0	9.5
60	3.2	181.0	-0.7	11.07	3.1	3.2	1,00	4.2	3.7	5,2	47.	-2.3	9.0
61	3.1	180.6	-0.8	25.75	2.2	3.1	1,05	2.7	2.2	7,5	47.	-6.3	8.1

Table 6-29. Gauge 9 - 17 May

M109 TEST 17 MAY 79 ABERDEEN PG

GAUGE 10

SHOT	MAXIMUM PRESSURE PSI	DA	MIN PSI	TIME MIN MS	INIT REFL MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	2.0	177.0	-0.9	25.98	1.7	2.0	2.85	2.4	1.9	0.0	65.	-0.3	5.9
2	2.2	177.5	-0.9	33.84	1.8	2.2	1.71	2.3	2.0	0.0	66.	0.3	7.8
3	2.0	176.9	-0.9	33.75	1.9	2.0	1.02	2.6	2.3	0.0	90.	-1.3	5.0
4	1.8	175.8	-0.9	14.69	1.5	1.8	1.89	1.7	1.6	4.1	94.	-0.9	4.8
5	1.8	175.7	-0.8	14.63	1.5	1.8	1.85	1.8	1.7	0.0	94.	-0.5	8.4
6	1.8	175.8	-0.7	26.38	1.6	1.8	2.25	1.9	1.8	4.1	71.	-0.6	4.9
7	2.0	176.9	-0.9	30.60	1.1	2.0	1.85	1.2	1.2	11.7	59.	-0.7	11.8
8	2.2	177.6	-0.9	38.45	1.1	2.2	2.86	1.3	1.2	12.0	53.	-0.3	11.7
9	2.2	177.5	-0.8	33.78	1.1	2.2	1.71	1.2	1.2	11.5	67.	-0.3	11.6
10	2.0	176.8	-0.6	40.39	2.0	1.5	1.10	1.9	1.8	5.7	54.	-1.4	5.2
11	1.9	176.5	-0.6	40.75	1.9	1.4	0.96	1.8	1.7	10.8	54.	-0.8	8.1
12	2.0	176.8	-0.6	40.36	2.0	1.4	1.38	2.3	2.1	11.2	58.	-0.5	8.5
13	1.4	173.6	-0.6	36.81	1.3	1.4	5.70	1.6	1.5	11.2	61.	-1.2	8.8
14	1.6	174.8	-0.6	36.51	1.4	1.6	5.94	1.7	1.6	11.4	59.	-0.3	9.1
15	1.5	174.0	-0.6	33.63	1.4	1.5	5.66	1.4	1.4	10.9	57.	1.9	8.8
16	2.1	177.1	-0.6	29.84	1.0	2.1	1.49	0.9	0.7	9.1	52.	-0.9	7.9
17	2.1	177.0	-0.6	29.21	2.1	1.8	1.54	2.3	2.2	8.4	50.	-4.0	7.8
18	2.0	177.0	-0.7	28.55	1.2	2.0	1.45	0.6	0.4	8.8	52.	-3.7	8.2
19	2.7	179.3	-0.7	30.45	2.7	2.3	5.64	0.0	2.2	5.1	53.	-1.6	8.5
20	2.6	179.0	-0.7	30.36	2.6	2.2	5.31	0.0	2.3	5.1	52.	-2.7	8.9
21	2.6	179.1	-0.6	30.51	2.6	2.1	0.51	0.0	2.2	5.0	53.	-2.5	5.8
22	2.1	177.4	-0.6	14.34	2.1	1.7	0.60	0.0	1.9	10.3	55.	-0.4	9.7
23	2.5	178.6	-0.6	32.09	2.5	1.9	2.94	0.0	2.0	9.9	49.	-0.9	9.9
24	2.2	177.7	-0.6	31.58	2.2	1.8	0.61	0.0	1.9	9.7	53.	-1.1	10.2
25	2.6	179.2	-0.6	41.48	2.6	2.3	1.38	0.0	2.6	8.4	48.	-1.2	9.3
26	2.7	179.3	-0.6	30.70	2.7	2.2	1.06	0.0	2.5	8.4	50.	-4.2	9.1
27	2.6	178.9	-0.7	29.88	2.6	2.3	1.11	0.0	2.5	8.4	49.	-1.5	9.0
28	3.6	181.9	-1.1	30.74	3.6	3.0	0.57	0.0	3.1	6.4	53.	-5.2	8.8
29	3.5	181.7	-0.8	31.58	3.5	3.1	0.61	3.2	3.1	6.3	54.	-7.3	8.6
30	3.8	182.3	-1.0	30.84	3.8	3.3	6.55	3.5	3.4	5.8	50.	-0.8	14.1
31	3.9	182.6	-0.8	32.00	3.9	3.2	3.81	3.1	3.0	8.6	53.	-6.6	12.1
32	3.5	181.7	-0.8	25.49	3.5	3.0	1.05	0.0	2.9	10.5	50.	-3.6	12.7
33	3.5	181.5	-0.9	15.75	3.5	3.1	3.79	0.0	2.8	8.9	47.	-4.4	12.4
34	3.7	182.1	-1.0	29.76	3.7	3.2	1.58	0.0	4.0	6.4	50.	-2.6	12.6
35	3.8	182.4	-0.9	8.61	3.8	3.3	1.35	4.1	3.9	6.3	51.	-3.3	12.5
36	4.0	182.8	-0.9	8.71	4.0	3.2	1.43	4.7	4.4	6.3	47.	-4.6	12.4
37	1.9	176.2	-0.8	32.29	1.9	1.7	8.05	2.2	2.0	6.6	64.	-7.7	10.3
38	2.5	178.5	-0.8	32.36	2.5	1.7	4.45	2.0	1.9	6.6	58.	-1.9	6.0
39	2.3	178.0	-0.7	26.90	2.3	1.9	7.75	2.4	2.2	14.7	58.	-1.8	11.5
40	1.4	173.5	-0.6	32.48	1.3	1.4	3.59	1.4	1.3	13.4	87.	-1.7	9.8
41	1.5	174.3	-0.6	32.83	1.4	1.5	4.09	1.5	1.5	13.9	87.	-0.9	9.9
42	1.4	173.7	-0.6	36.90	1.4	1.4	3.34	1.5	1.4	13.1	87.	-0.8	9.7
43	2.5	178.8	-0.7	31.05	1.3	2.5	2.30	1.6	1.0	7.9	53.	-3.0	7.9
44	3.0	180.3	-0.7	31.16	3.0	3.0	5.50	2.9	2.8	5.4	52.	-3.0	11.6
45	3.0	180.4	-0.8	29.18	3.0	2.7	5.44	2.5	2.4	5.3	52.	-3.3	11.1
46	2.9	180.1	-0.9	28.01	2.9	2.9	5.50	2.5	2.4	5.4	51.	-2.8	12.1
47	2.8	179.8	-0.7	32.79	2.6	2.8	2.76	2.3	2.3	9.4	49.	-1.7	10.7
48	2.8	179.7	-0.7	35.59	2.6	2.8	2.76	2.2	2.2	8.8	48.	-2.6	10.5
49	3.1	180.6	-0.8	18.19	2.8	3.1	3.08	2.3	2.2	7.6	46.	-1.0	10.2
50	4.6	184.0	-0.7	27.83	4.6	3.2	0.55	3.8	3.7	6.6	41.	0.4	10.0
51	4.3	183.4	-0.7	32.33	4.3	3.2	0.56	3.7	3.6	6.6	46.	-0.7	9.9
52	4.4	183.5	-0.8	32.08	4.4	3.2	0.56	3.7	3.6	6.9	44.	-2.9	10.2
53	3.9	182.5	-1.1	24.39	3.9	3.0	0.55	3.3	3.2	6.8	54.	-4.5	7.7
54	4.2	183.2	-0.9	36.05	4.2	2.9	1.05	3.3	3.2	5.4	48.	-4.0	7.5
55	4.2	183.1	-0.9	26.23	4.2	2.7	1.52	3.5	3.4	5.4	48.	-3.1	7.5
56	3.7	182.2	-1.0	36.59	3.7	2.3	4.70	3.0	2.8	10.9	56.	-2.1	12.1
57	3.4	181.4	-0.9	37.34	3.4	2.0	5.08	2.9	2.8	11.1	51.	-3.7	12.5
58	3.6	181.9	-0.9	38.23	3.6	2.1	5.04	3.0	2.9	11.0	50.	-12.3	11.8
59	2.5	178.8	-0.9	31.55	1.9	2.5	1.86	2.2	1.9	7.5	63.	-2.5	11.8
60	2.4	178.4	-0.9	30.89	2.0	2.4	1.86	2.3	2.1	7.5	61.	-3.0	11.8
61	2.7	179.4	-0.9	30.30	1.9	2.7	1.80	2.8	2.3	7.2	51.	-1.6	11.8

Table 6-30. Gauge 10 - 17 May

M198 TEST 18 MAY 79 ABERDEEN PG

GAUGE 1

SHOT	MAXIMUM PRESSURE PSI	MAXIMUM PRESSURE DR	MIN PSI	TIME MIN MS	INIT REFL MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-MS	POS IMP
1	1.4	173.9	-0.5	18.14	1.1	1.4	3.42	1.2	1.1	7.6	71.	-0.2	3.9
2	1.5	174.2	-0.5	18.04	1.2	1.5	3.49	1.0	1.0	7.7	71.	-0.8	4.0
3	1.3	173.3	-0.5	13.90	1.1	1.3	3.42	1.2	1.2	3.4	71.	-0.4	4.4
4	1.3	173.1	-0.4	18.39	1.0	1.3	1.49	0.9	0.9	6.6	71.	0.5	3.9
5	1.2	172.1	-0.4	15.09	1.0	1.2	1.60	0.9	0.8	6.6	71.	0.9	4.1
6	1.6	174.6	-0.5	16.54	1.5	1.6	1.89	1.5	1.4	9.9	70.	-2.8	6.1
7	1.2	172.3	-0.4	15.09	1.0	1.2	1.95	0.9	0.9	6.8	71.	0.2	4.2
8	1.4	173.7	-0.5	10.23	1.4	1.1	0.85	1.5	1.4	6.8	70.	-0.2	3.9
9	1.3	173.0	-0.4	10.00	1.3	1.2	1.02	1.3	1.2	6.5	70.	-0.9	4.1
10	1.3	173.0	-0.4	10.56	1.3	1.2	1.02	1.4	1.2	6.4	70.	0.4	4.0
11	1.2	172.3	-0.5	13.38	0.9	1.2	2.98	0.9	0.8	7.9	56.	0.0	3.9
12	1.3	173.0	-0.5	14.03	1.0	1.3	3.04	0.8	0.8	8.2	59.	-1.7	4.1
13	1.1	171.9	-0.5	12.26	0.9	1.1	3.03	0.9	0.8	7.6	98.	0.1	4.0
14	1.2	172.3	-0.4	19.27	1.2	0.9	1.51	1.6	1.5	7.2	46.	0.0	3.6
15	1.2	172.3	-0.4	10.96	1.2	0.9	1.61	1.6	1.5	7.9	59.	-0.5	3.8
16	1.2	172.2	-0.4	12.79	1.2	1.0	1.48	1.5	1.4	7.8	68.	0.2	3.8
17	1.3	173.2	-0.4	13.81	1.3	1.0	0.60	1.1	1.1	6.5	57.	0.1	3.5
18	1.2	172.3	-0.4	14.03	1.2	0.9	0.84	1.1	1.0	7.1	111.	1.0	3.4
19	1.2	172.1	-0.4	15.46	1.2	1.0	0.57	1.0	1.0	7.0	56.	-0.4	3.4

Table 6-31. Gauge 1 - 18 May

M198 TEST 18 MAY 79 ABERDEEN PG

GAUGE 2

SHOT	MAXIMUM PRESSURE PSI	DR	MIN PST	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-MS	POS IMP
1	1.6	174.9	-0.8	16.94	1.6	1.2	4.43	1.5	1.4	4.2	45.	0.8	5.1
2	1.7	175.2	-0.6	13.36	1.7	1.3	4.44	1.6	1.5	4.2	37.	-0.9	5.0
3	1.6	174.8	-0.7	14.73	1.6	1.4	4.41	1.5	1.5	9.0	65.	-1.0	5.5
4	1.5	174.2	-0.6	17.60	1.4	1.5	2.03	1.3	1.2	7.2	45.	-0.3	5.0
5	1.5	174.2	-0.5	12.90	1.4	1.5	1.83	1.4	1.3	7.2	61.	-0.2	5.3
6	1.8	176.0	-0.6	16.16	1.6	1.8	2.39	1.6	1.5	9.4	47.	-2.9	8.1
7	1.5	174.0	-0.5	12.49	1.5	1.4	1.93	1.4	1.4	8.2	84.	-1.0	5.5
8	1.9	176.1	-0.6	10.34	1.9	1.4	0.93	1.8	1.7	7.1	34.	-0.8	5.1
9	1.9	176.1	-0.5	23.05	1.9	1.5	0.90	1.9	1.8	7.0	56.	-1.0	5.3
10	1.9	176.5	-0.6	10.63	1.9	1.5	1.43	2.0	1.9	7.0	35.	0.8	5.1
11	1.1	171.9	-0.5	15.54	0.9	1.1	2.78	0.9	0.9	7.7	106.	2.9	4.0
12	1.1	171.3	-0.6	14.28	0.9	1.1	2.92	0.9	0.8	7.9	104.	0.1	4.2
13	1.1	171.3	-0.5	13.98	0.9	1.1	2.94	0.9	0.9	7.7	68.	1.1	4.1
14	1.3	172.8	-0.5	18.46	1.3	1.0	1.70	1.7	1.6	7.8	65.	0.5	3.8
15	1.2	172.4	-0.4	14.40	1.2	1.0	1.60	1.5	1.5	7.4	65.	-0.2	3.9
16	1.2	172.4	-0.5	14.71	1.2	1.0	1.73	1.6	1.5	7.4	66.	0.5	3.9
17	1.2	172.3	-0.4	12.45	1.2	1.0	0.82	1.2	1.2	7.0	63.	0.4	3.9
18	1.1	171.7	-0.4	11.04	1.1	0.9	0.91	1.1	1.1	7.3	59.	0.0	3.7
19	1.2	172.1	-0.4	12.57	1.2	0.9	0.90	1.1	1.1	7.2	65.	0.9	3.8

Table 6-32. Gauge 2 - 18 May

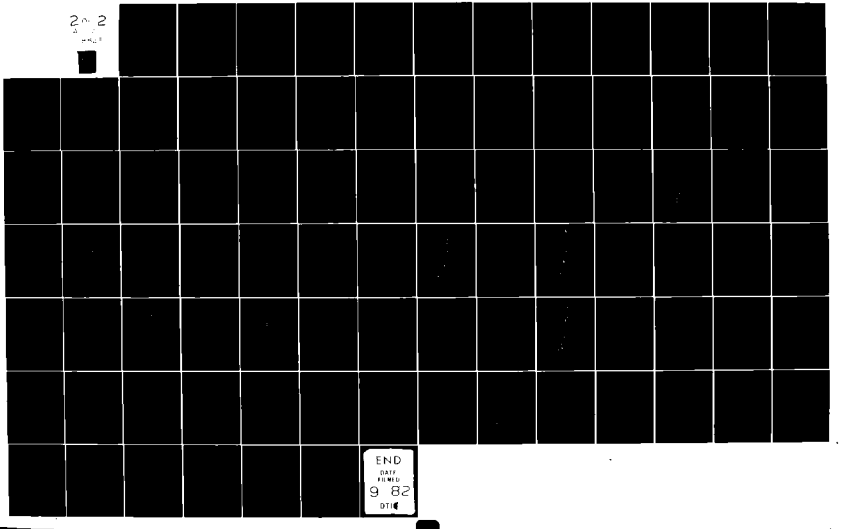
M198 TEST 18 MAY 79 ABERDEEN PG

GAUGE 3

SHOT	MAXIMUM PRESSURE PSI	MAXIMUM PRESSURE DR	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	1.8	175.9	-0.8	21.56	1.8	1.5	5.06	1.4	1.3	4.5	66.	0.9	4.4
2	1.8	175.9	-0.7	14.84	1.8	1.8	5.11	1.5	1.3	4.9	43.	-1.5	4.4
3	1.8	176.0	-0.7	14.63	1.8	1.8	5.05	1.5	1.4	4.7	65.	1.0	5.2
4	1.7	175.6	-0.7	13.46	1.6	1.7	2.26	1.7	1.6	6.5	38.	-0.2	5.1
5	1.9	176.1	-0.7	15.09	1.7	1.9	2.20	1.8	1.4	7.1	49.	0.7	5.2
6	2.1	177.2	-0.7	14.93	2.0	2.1	2.17	1.8	1.7	8.7	49.	-0.7	8.2
7	1.8	175.7	-0.7	12.55	1.8	1.8	2.30	1.9	1.7	6.6	57.	-1.3	5.4
8	2.0	176.9	-0.6	9.81	2.0	1.6	1.01	1.8	1.7	6.1	37.	0.7	5.2
9	2.1	177.2	-0.6	22.23	2.1	1.6	1.00	1.8	1.7	6.1	52.	0.1	5.3
10	2.0	177.0	-0.7	10.44	2.0	1.6	1.04	1.7	1.6	6.1	35.	0.5	5.2
11	1.4	173.9	-0.6	17.40	1.2	1.4	2.84	1.1	1.0	2.7	61.	0.9	3.7
12	1.3	173.1	-0.5	18.63	1.2	1.3	2.81	1.1	1.0	2.6	66.	-2.2	3.8
13	1.4	173.4	-0.6	16.23	1.2	1.4	2.85	1.0	0.9	2.7	90.	0.1	3.9
14	1.4	173.7	-0.5	17.99	1.4	1.2	1.68	1.7	1.7	6.8	60.	0.0	3.8
15	1.4	173.7	-0.4	14.95	1.4	1.2	1.65	1.9	1.8	6.7	60.	1.0	3.9
16	1.4	173.5	-0.5	17.09	1.4	1.2	1.68	1.8	1.7	6.8	80.	-0.6	3.8
17	1.5	174.5	-0.4	9.75	1.5	1.2	0.95	1.7	1.5	6.6	63.	-0.5	3.8
18	1.5	174.3	-0.4	10.93	1.5	1.2	0.98	1.7	1.5	6.5	30.	0.9	3.6
19	1.5	174.5	-0.4	24.36	1.5	1.2	0.95	1.8	1.5	6.6	35.	0.4	3.7

Table 6-33. Gauge 3 - 18 May

AD-A118 823 JAYCOR ALEXANDRIA VA F/G 19/6
TEST PLANNING, COLLECTION, AND ANALYSIS OF PRESSURE DATA RESULT--ETC(U)
MAY 80 S SLINKER, H C EVANS DAMD17-78-C-8087
UNCLASSIFIED NL



M198 TEST 18 MAY 79 ABERDEEN PG

GAUGE 4

SHOT	MAXIMUM PRESSURE PSI	MAXIMUM PRESSURE DR	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	2.1	177.1	-0.8	15.99	2.1	1.4	0.81	2.0	1.9	4.0	42.	0.1	3.5
2	2.0	176.8	-0.7	15.81	2.0	1.6	0.88	2.1	2.0	3.9	41.	-0.3	3.5
3	2.0	176.7	-0.8	13.19	2.0	1.4	0.84	2.0	2.0	4.3	69.	0.9	3.7
4	1.8	175.8	-0.8	16.35	1.8	1.7	2.95	1.7	1.6	6.4	52.	0.0	5.8
5	2.1	177.0	-0.8	13.93	2.1	1.5	2.64	1.8	1.7	7.3	52.	0.0	6.1
6	2.5	178.7	-0.8	15.24	2.4	2.5	2.71	2.4	2.3	10.3	47.	-0.1	10.0
7	1.9	176.3	-0.8	12.64	1.9	1.5	3.61	1.6	1.5	6.2	55.	0.5	6.0
8	2.5	178.6	-0.8	10.01	2.5	2.1	1.11	2.8	2.7	6.5	36.	0.4	6.0
9	2.4	178.4	-0.6	10.10	2.4	1.9	1.13	2.9	2.7	6.0	53.	-0.4	6.2
10	2.5	178.6	-0.8	12.25	2.5	1.9	1.14	3.0	2.7	6.0	36.	0.3	6.0
11	2.4	178.3	-0.8	16.00	2.4	1.4	0.56	1.9	1.8	4.4	36.	-0.4	3.4
12	2.5	178.7	-0.7	17.74	2.5	1.6	0.63	2.0	1.9	4.1	38.	-0.1	3.5
13	2.0	176.9	-0.7	16.06	2.0	1.4	0.66	1.9	1.8	4.1	40.	1.4	3.5
14	1.9	176.4	-0.9	16.89	1.9	1.3	3.00	1.8	1.7	6.6	44.	-1.1	5.8
15	1.8	175.8	-0.8	16.48	1.8	1.4	2.80	1.7	1.6	7.2	37.	0.1	5.9
16	2.0	176.5	-0.8	13.78	2.0	1.4	0.53	1.6	1.5	7.1	44.	2.6	5.9
17	2.4	178.4	-0.6	18.19	2.4	1.6	0.90	2.6	2.5	6.2	61.	0.5	5.9
18	2.2	177.6	-0.8	10.56	2.2	1.7	0.88	2.3	2.3	6.3	34.	0.6	5.9
19	2.6	178.9	-0.7	10.35	2.6	1.6	1.24	2.8	2.7	6.1	38.	-3.0	6.0

Table 6-34. Gauge 4 - 18 May

M198 TEST 18 MAY 79 ABERDEEN PG

GAUGE 5

SHOT	MAXIMUM PRESSURE PSI	MAXIMUM PRESSURE DB	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	2.1	177.0	-0.8	14.70	2.1	1.7	0.93	1.9	1.8	5.4	43.	-4.4	3.7
2	2.2	177.5	-0.8	18.91	2.2	1.8	0.59	1.8	1.8	4.6	41.	-1.3	3.7
3	2.1	177.4	-0.9	17.60	2.1	1.6	0.57	1.9	1.8	5.1	60.	-1.0	4.0
4	2.1	177.1	-0.9	17.39	2.1	1.6	0.90	2.1	1.9	7.3	47.	-0.2	6.0
5	2.1	177.1	-0.9	15.01	2.1	1.7	0.89	1.6	1.4	7.1	60.	-1.2	6.1
6	2.8	179.6	-1.0	14.95	2.8	2.4	3.05	2.1	2.0	10.1	49.	-2.5	10.3
7	2.2	177.6	-0.9	15.94	2.2	1.7	0.89	1.7	1.6	6.6	58.	-0.2	6.3
8	2.4	178.2	-0.8	9.93	2.4	1.9	1.68	3.4	3.0	6.4	40.	-0.5	6.3
9	2.3	177.8	-0.6	22.30	2.3	2.0	1.68	3.1	2.9	6.3	59.	-1.6	6.4
10	2.6	179.0	-0.8	10.66	2.6	1.8	1.66	3.4	3.3	6.5	39.	0.0	6.2
11	2.9	180.0	-1.0	19.83	2.9	2.2	0.55	1.9	1.8	3.9	37.	0.6	4.0
12	2.5	178.7	-0.9	20.61	2.5	2.4	0.60	1.9	1.8	3.9	38.	-4.1	4.2
13	2.9	179.9	-1.2	16.04	2.9	2.3	0.54	2.0	1.9	6.1	37.	1.7	5.1
14	2.3	177.9	-1.1	14.18	2.3	2.2	4.65	2.4	2.3	6.5	40.	1.0	7.8
15	2.4	178.3	-1.1	15.49	2.4	2.3	0.64	1.8	1.7	6.9	42.	1.6	7.9
16	2.6	179.1	-1.2	9.94	2.6	2.3	4.04	2.1	2.0	6.7	45.	1.1	8.2
17	2.8	179.8	-1.1	8.95	2.8	2.6	1.77	3.6	3.3	5.2	58.	2.1	8.4
18	2.9	180.0	-1.1	9.26	2.9	2.5	2.30	4.4	4.1	5.1	38.	-2.2	7.9
19	2.9	180.1	-1.3	9.64	2.9	2.6	3.23	4.1	3.6	5.2	44.	0.5	8.3

Table 6-35. Gauge 5 - 18 May

M198 TEST 18 MAY 79 ABERDEEN PG

GAUGE 6

SHOT	MAXIMUM PRESSURE PSI	DR	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	1.1	171.7	-0.5	14.36	1.1	1.1	3.60	0.9	0.9	8.0	76.	-0.6	4.5
2	1.1	171.3	-0.5	13.21	1.0	1.1	3.58	0.9	0.9	8.1	77.	0.1	4.7
3	1.1	171.7	-0.5	14.34	1.1	1.1	3.58	0.9	0.9	8.4	76.	-2.3	4.8
4	1.3	173.0	-0.5	19.58	1.0	1.3	1.39	0.8	0.8	6.6	96.	0.0	4.2
5	1.3	173.0	-0.5	12.38	1.0	1.3	1.20	0.9	0.9	7.5	95.	1.0	4.5
6	1.5	174.5	-0.5	15.56	1.4	1.5	1.23	1.2	1.2	10.5	76.	-2.9	7.0
7	1.5	174.2	-0.4	12.55	1.3	1.5	1.01	1.1	1.0	7.6	76.	1.3	4.8
8	1.3	173.2	-0.4	10.31	1.3	1.2	0.64	1.3	1.3	7.3	76.	0.9	4.4
9	1.4	173.7	-0.4	9.78	1.4	1.2	0.64	1.4	1.3	6.9	76.	0.5	4.5
10	1.3	173.3	-0.5	10.94	1.3	1.2	0.63	1.3	1.2	6.7	76.	1.3	4.3
11	1.3	173.1	-0.6	17.35	1.3	1.0	4.06	1.1	1.1	8.2	35.	1.4	4.7
12	1.4	173.5	-0.5	14.34	1.4	1.3	5.05	1.2	1.1	8.5	48.	3.1	5.0
13	1.3	173.0	-0.5	16.40	1.3	1.1	4.09	1.1	1.1	8.1	53.	1.3	4.8
14	1.4	173.5	-0.5	22.05	1.3	1.4	1.05	1.5	1.5	7.3	46.	1.5	4.5
15	1.3	172.8	-0.5	16.18	1.3	1.3	1.38	1.5	1.4	8.0	47.	0.6	4.6
16	1.4	173.4	-0.5	13.80	1.4	1.3	1.76	1.8	1.6	8.1	44.	2.1	4.6
17	1.9	176.2	-0.4	15.45	1.9	1.4	0.60	1.5	1.5	6.3	40.	-0.8	4.3
18	1.8	176.0	-0.4	24.68	1.8	1.2	0.64	1.5	1.5	6.8	31.	1.1	4.3
19	1.8	175.9	-0.5	15.24	1.8	1.2	0.65	1.5	1.5	6.8	30.	0.8	4.3

Table 6-36. Gauge 6 - 18 May

M198 TEST 18 MAY 79 ABERDEEN PG

GAUGE 7

SHOT	MAXIMUM PRESSURE PSI	DB	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	1.3	172.7	-0.6	13.57	1.3	1.1	0.68	1.2	1.2	4.4	179.	-1.9	2.8
2	1.4	173.4	-0.7	13.34	1.4	1.2	0.54	1.3	1.2	8.1	40.	1.1	5.3
3	1.2	172.6	-0.7	15.16	1.2	1.1	0.71	1.2	1.1	8.5	112.	-0.1	5.5
4	1.4	173.7	-0.6	19.09	1.1	1.4	2.60	1.1	1.1	6.7	47.	0.1	4.9
5	1.3	172.8	-0.6	18.83	1.1	1.3	1.74	1.1	1.1	7.2	86.	-4.8	5.0
6	1.7	175.2	-0.6	16.26	1.6	1.7	1.50	1.5	1.5	10.0	51.	-2.2	7.8
7	1.3	173.1	-0.6	12.64	1.2	1.3	1.64	1.2	1.1	7.3	67.	-6.2	5.
8	1.7	175.6	-0.6	9.81	1.7	1.5	0.61	1.7	1.7	7.1	35.	1.3	5.0
9	1.8	175.6	-0.5	9.60	1.8	1.5	0.60	1.7	1.6	6.4	53.	0.1	5.2
10	1.8	175.8	-0.6	10.90	1.8	1.5	0.56	1.7	1.6	6.4	37.	2.9	5.0
11	1.6	174.7	-0.6	17.76	1.6	1.2	4.63	1.4	1.4	8.6	95.	2.1	5.2
12	1.6	175.0	-0.6	14.65	1.6	1.3	4.93	1.5	1.4	8.9	40.	2.0	5.5
13	1.6	174.9	-0.7	16.15	1.6	1.3	4.76	1.5	1.4	8.0	42.	2.3	5.3
14	1.8	175.9	-0.7	19.70	1.4	1.8	1.61	1.3	1.3	6.7	38.	1.1	5.2
15	1.6	175.1	-0.7	10.94	1.5	1.6	1.49	1.4	1.3	7.9	48.	-0.7	5.5
16	1.8	175.7	-0.6	15.76	1.6	1.8	1.54	1.4	1.4	7.5	50.	-1.0	5.3
17	2.0	176.5	-0.5	13.10	2.0	1.8	0.68	1.9	1.8	6.0	55.	0.8	5.1
18	2.1	177.3	-0.5	24.91	2.1	1.7	0.56	2.0	1.9	6.7	37.	3.9	5.1
19	2.1	177.1	-0.6	13.21	2.1	1.7	0.53	2.0	1.9	6.8	39.	1.1	5.1

Table 6-37. Gauge 7 - 18 May

M198 TEST 18 MAY 79 ABERDEEN PG

GAUGE 8

SHOT	MAXIMUM PRESSURE PSI	DA	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	1.4	173.5	-0.7	18.77	1.4	1.3	5.40	1.3	1.2	4.5	41.	0.5	5.1
2	1.4	173.4	-0.7	15.18	1.4	1.3	0.65	1.3	1.2	4.5	43.	0.0	3.1
3	1.2	172.3	-0.7	14.54	1.2	1.0	5.39	1.1	1.1	8.4	92.	-1.5	4.8
4	1.2	172.0	-0.6	19.56	1.2	0.9	0.55	1.0	1.0	7.0	54.	-0.9	4.3
5	1.2	172.0	-0.8	14.73	1.2	0.9	0.55	1.0	1.0	7.5	93.	-0.4	4.5
6	1.3	173.0	-0.7	15.21	1.3	1.0	0.55	1.3	1.2	10.4	56.	-5.3	6.6
7	1.2	172.2	-0.7	17.06	1.2	0.9	1.81	1.1	1.1	7.9	93.	-1.6	4.7
8	1.3	173.3	-0.6	11.24	1.3	1.0	0.54	1.3	1.3	6.8	39.	-1.7	4.0
9	1.4	173.4	-0.5	25.56	1.4	1.0	0.54	1.3	1.3	6.3	59.	-2.5	4.2
10	1.3	173.0	-0.8	10.56	1.3	1.0	0.60	1.3	1.2	6.4	55.	-1.0	4.1
11	1.4	173.4	-0.7	15.19	1.4	1.2	5.04	1.3	1.3	4.4	46.	-0.6	4.5
12	1.3	173.3	-0.8	17.45	1.3	1.2	5.05	1.3	1.3	8.9	59.	-0.9	4.9
13	1.3	173.1	-0.8	16.23	1.3	1.2	5.06	1.2	1.2	7.7	48.	-1.2	4.6
14	1.3	173.1	-0.7	18.02	1.3	1.0	1.94	1.2	1.2	6.1	44.	-1.2	4.3
15	1.3	173.2	-0.8	15.99	1.3	1.0	1.81	1.3	1.2	6.2	57.	-1.0	4.4
16	1.3	173.2	-0.8	13.36	1.3	1.0	1.93	1.3	1.2	6.3	58.	-1.7	4.3
17	1.4	173.7	-0.7	12.44	1.4	1.0	0.54	1.4	1.3	5.2	63.	-1.8	3.8
18	1.4	173.5	-0.7	13.09	1.4	1.0	0.53	1.3	1.3	5.1	51.	-1.7	3.8
19	1.4	173.7	-0.7	13.03	1.4	1.0	0.54	1.4	1.4	5.2	57.	-0.9	3.7

Table 6-38. Gauge 8 - 18 May

M198 TEST 18 MAY 79 ABERDEEN PG

GAUGE 9

SHOT	MAXIMUM PRESSURE PSI	DA	MIN PSI	TIME MIN MS	INIT REFL MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP -MS
1	1.7	175.3	-0.8	21.73	1.7	1.5	0.54	1.5	1.5	4.4	48.	1.2	3.4
2	1.8	175.9	-0.8	16.04	1.8	1.5	0.64	1.5	1.4	4.0	42.	-0.3	3.4
3	1.9	176.1	-0.8	14.53	1.9	1.4	0.63	1.6	1.5	4.4	61.	-1.4	3.6
4	1.6	174.7	-0.7	18.30	1.6	1.6	2.31	1.3	1.3	7.0	53.	2.0	5.5
5	1.7	175.4	-0.8	14.66	1.7	1.6	3.17	1.4	1.4	6.9	61.	1.5	5.6
6	2.3	177.9	-0.9	16.71	2.3	2.1	2.03	2.0	2.0	10.3	57.	-4.8	9.4
7	1.8	175.9	-0.8	14.60	1.7	1.8	2.19	1.7	1.7	8.2	56.	3.2	6.2
8	2.6	179.0	-0.7	9.59	2.6	1.6	1.13	3.0	3.0	6.2	37.	1.2	5.6
9	3.0	180.3	-0.5	10.86	3.0	1.8	1.01	3.5	3.3	6.3	50.	-1.3	5.8
10	2.8	179.8	-0.8	11.60	2.8	1.9	1.06	3.5	3.3	6.4	38.	1.3	5.6
11	2.1	177.4	-0.9	14.84	2.1	1.6	0.54	1.8	1.8	4.4	45.	5.9	3.5
12	2.5	178.5	-0.8	11.81	2.5	1.7	0.54	2.0	1.9	4.5	39.	1.6	3.7
13	2.6	178.9	-0.8	17.05	2.6	1.8	5.29	2.1	2.0	4.2	46.	0.8	5.0
14	2.2	177.8	-0.8	11.75	2.2	2.2	2.63	1.9	1.9	6.4	45.	2.2	6.7
15	2.4	178.3	-0.9	17.40	2.4	2.2	2.38	1.9	1.8	6.6	40.	2.3	6.9
16	2.4	178.4	-1.1	13.07	2.4	2.3	2.36	1.9	1.8	6.6	43	2.7	6.9
17	2.5	178.8	-0.8	12.23	2.5	2.1	0.68	2.5	2.4	5.5	55.	3.4	6.7
18	3.0	180.3	-0.8	9.21	3.0	2.4	0.53	2.6	2.5	5.6	44.	6.9	8.6
19	2.8	179.8	-0.8	12.10	2.8	2.2	0.73	2.8	2.7	5.6	44.	4.4	6.6

Table 6-39. Gauge 9 - 18 May

M198 TEST 18 MAY 79 ABERDEEN PG

GAUGE 10

SHOT	MAXIMUM PRESSURE PSI	DR	MIN PSI	TIME MIN MS	INIT MAX PSI	REFL MAX PSI	TIME REFL MS	EST MAX PSI	AVE EST PSI	ADUR MS	BDUR MS	TOT IMP --PSI-	POS IMP MS
1	2.4	178.4	-0.9	17.11	2.4	2.1	1.39	2.0	1.9	3.9	44.	-0.3	3.8
2	2.6	179.0	-1.0	19.09	2.6	1.9	0.71	2.2	2.1	4.1	44.	3.6	4.0
3	2.2	177.6	-0.8	18.04	2.2	1.8	0.57	2.0	2.0	5.6	61.	1.3	4.8
4	2.2	177.6	-0.9	18.38	2.1	2.2	3.65	2.7	2.4	6.6	49.	2.8	6.9
5	2.7	179.3	-0.9	18.04	2.4	2.7	3.79	2.6	2.5	5.8	53.	-0.4	6.7
6	3.2	180.8	-1.1	14.15	3.0	3.2	3.38	2.7	2.7	7.0	50.	-3.0	10.5
7	2.6	178.[illegible]	-0.9	14.30	2.4	2.6	3.73	2.0	1.9	6.6	50.	2.4	7.4
8	2.6	179.2	-1.1	9.38	2.3	2.6	1.60	2.1	2.0	4.7	37.	0.5	6.9
9	2.6	179.0	-1.0	8.76	2.5	2.6	1.85	2.5	2.3	4.1	54.	-0.7	6.9
10	2.7	179.3	-1.0	8.26	2.5	2.7	1.64	2.3	2.1	4.1	43.	1.2	6.7
11	2.8	179.6	-0.9	19.29	2.8	1.9	0.56	2.2	2.1	4.0	38.	-1.8	3.8
12	3.0	180.3	-0.9	18.51	3.0	2.0	0.56	2.3	2.3	4.2	47.	0.3	4.1
13	3.3	181.0	-0.9	16.50	3.3	2.1	6.25	2.3	2.2	4.7	41.	-0.5	6.3
14	2.9	180.0	-1.0	15.07	2.9	2.6	3.15	2.4	2.3	7.4	48.	0.5	7.6
15	2.4	178.4	-1.1	17.41	2.4	2.2	2.94	2.4	2.4	7.2	43.	0.6	7.8
16	2.9	180.1	-1.1	13.13	2.9	2.3	3.10	2.3	2.2	7.5	38.	3.1	7.7
17	2.8	179.8	-1.0	11.74	2.8	2.5	1.46	3.2	2.9	6.6	54.	0.6	7.6
18	2.8	179.8	-1.0	12.45	2.8	2.4	1.06	3.1	2.9	5.8	48.	1.2	7.3
19	3.0	180.3	-0.9	11.70	3.0	2.1	1.36	3.4	3.2	5.3	42.	0.6	7.1

Table 6-40. Gauge 10 - 18 May

SECTION 7
GRAPHS

7-1 INTRODUCTION

This section is divided into four parts. The first part consists of a set of graphs that illustrate the presence of the sonic boom shock waves produced by the projectile as it passes over the transducers. Part 2 consists of time histories of transducers which are considered faulty--either because of a problem in the transducer itself or in the recording electronics. Part 3 expands on Section 5 of this report by including several additional time histories and power spectra records from the crew compartment of the M109. Finally, the last part contains a sampling of pressure time histories to illustrate the variation in waveform shapes which can occur around these weapons. NOTE: (For the long time length pressure time histories the data was decimated before being plotted. Consequently, the peaks shown on these graphs are, in general, lower than the actual peaks given in the data tables).

7-2 SONIC BOOM

Figures 7-1 to 7-8 were made from transducers positioned along the 0° or 30° radials for both the M198 and the M109. These were gauges 1-4 for shots 1-18 on the first day of testing and for shots 1-19 on the second day. Conspicuous in these graphs is the presence of the sonic boom due to the projectile passing overhead. For the gauge located at 10 meters the overpressure due to the sonic boom can be very high (over 7 psi for the M198 at 45 mil QE). Figure 4 shows that the sonic boom is greatly reduced at the 30° radial since the projectile is not travelling directly overhead. As the transducer is moved farther from the muzzle it is seen that the sonic boom occurs earlier relative to the shock front from the explosion. This is because the projectile is travelling faster than the shock front.

For the purposes of analysis, the sonic boom contribution to the records was included because the phenomena is real and Mil-Std. 1474 does not rule on it. Consequently, these gauges are included along with the other gauges, e.g., those along the 120° radial which do not contain the sonic boom.

7-3 FAULTY TRANSDUCER RECORDS

At various times problems occurred in a transducer or the recording system. The most serious problems occurred in gauge 8 starting at about Shot 22 (see Figure 7-9 to 7-13 for examples of gauge 8). The gauge had been stationed at 10 meters from the muzzle. It was on the 150° radial for shots 1-9, on the 120° radial for shots 10-18 and was moved to the 90° radial at shot 19. The shock is directed into the 90-120° sector by the muzzle brake and it is possible the malfunction in gauge 8 is due to excessive heat from the blast. The gauge appeared to give accurate data at Shot 28 when it was moved to location B25 (see Figure 7-12) but for the rest of the test (all four days) the recordings from 8 are suspect. The time histories do not appear to have artifacts but the peak pressure values are consistently lower than expected. Consequently, all data results from gauge 8 are suspect.

Occasional problems occurred at various times with the other gauges (or their electronics). On Shots 38-42 of Day 1 of the test, oscillations occurred in the gauge 3 records (see Figures 7-14 to 7-16). This gauge was located at position C35. The gauge recovered on shot 43 and the data appears reliable for the rest of the test.

There was an occasional problem with drift for the following gauges and shots:

Day 1	Gauge 4	Shots 25-27	Location 60/10
Day 2	Gauge 4	Shots 38-46	Location 120/10
Day 2	Gauge 7	Shots 29-31	Location RL in M109
Day 3	Gauge 3	Shots 53-61	Location R5

Some of these records are illustrated in Figures 7-17 to 7-23.

7-4 M109 INTERIOR RECORDS

The third part of this section, Figure 7-24 to 7-56, contain more results from inside the M109. Samples of pressure records and power spectra are included for a detailed discussion the reader should refer to Section 5.

7-5 MISCELLANEOUS RECORDS

The last part of this section, Figure 7-57 to 7-75, contain a sampling of the pressure curves taken around the M109 and M198 to illustrate the diversity of waveforms which can occur. This indicates the need for a good theoretical model to predict the waveforms as an exhaustive experimental mapping of the field about the howitzer would be expensive and time consuming.

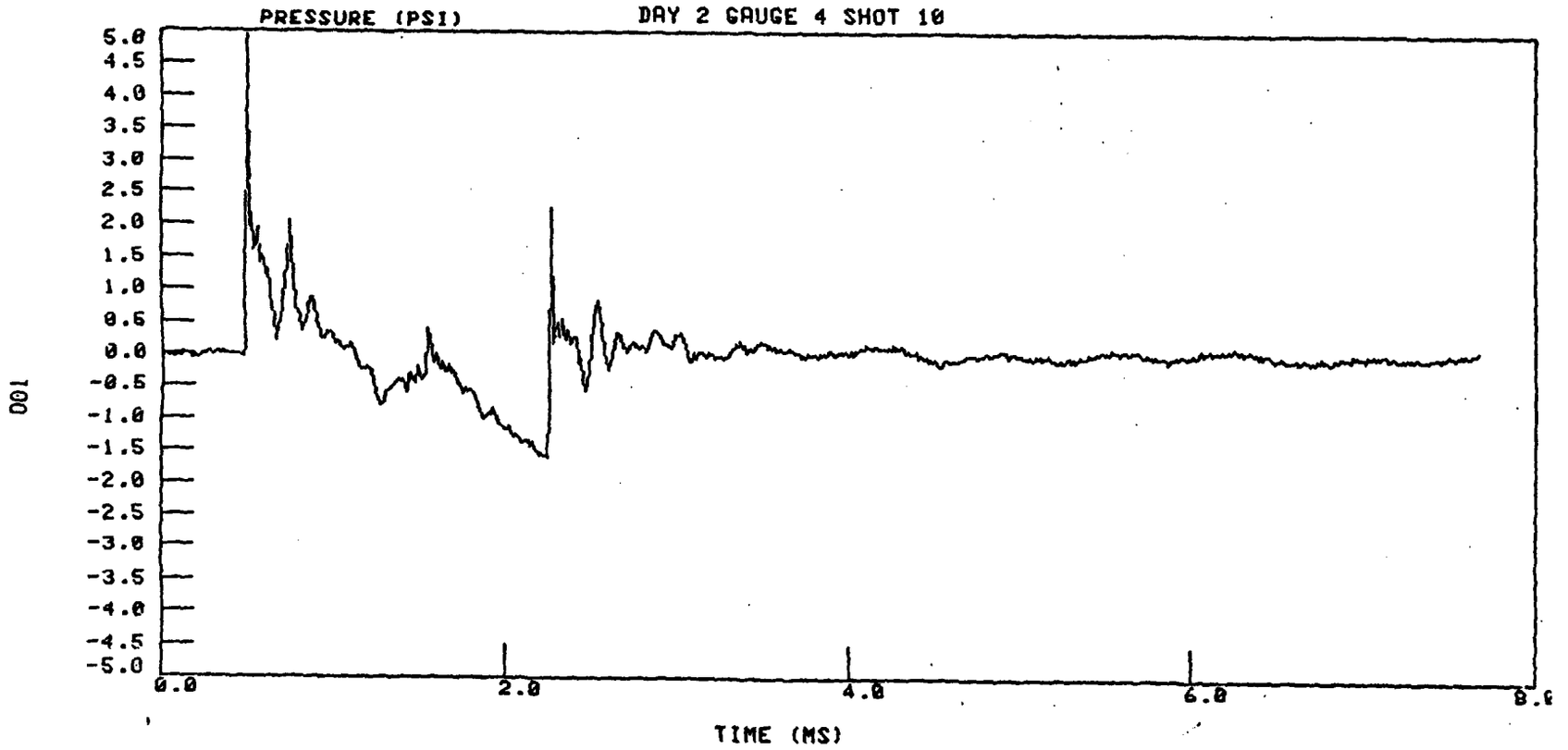

PRESSURE (PSI)
DAY 2 GAUGE 4 SHOT 10
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
-4.5
-5.0
001
0.0
2.0
4.0
6.0
TIME (MS)

Figure 7-1

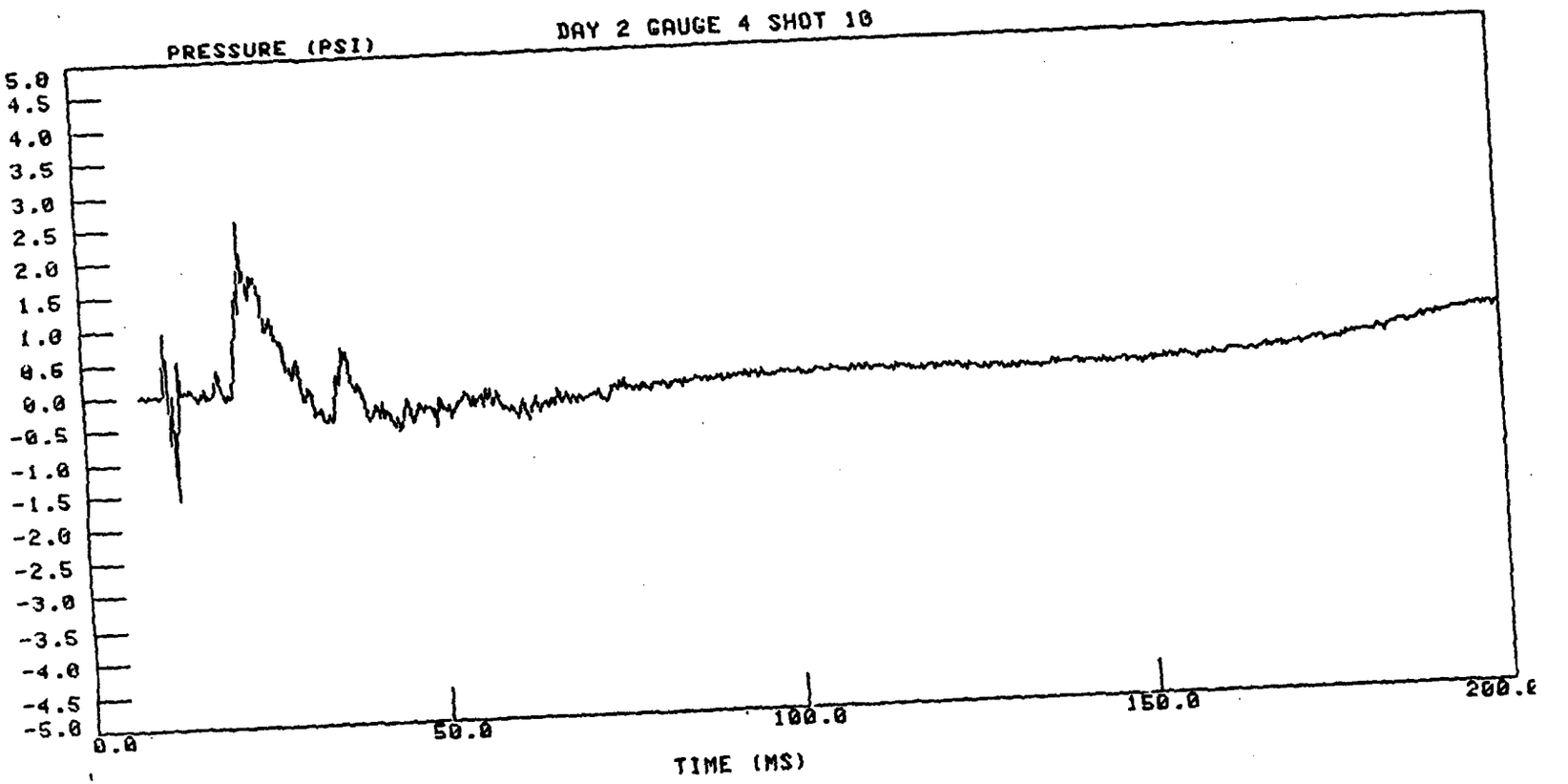

DAY 2 GAUGE 4 SHOT 10
PRESSURE (PSI)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
-4.5
-5.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-2

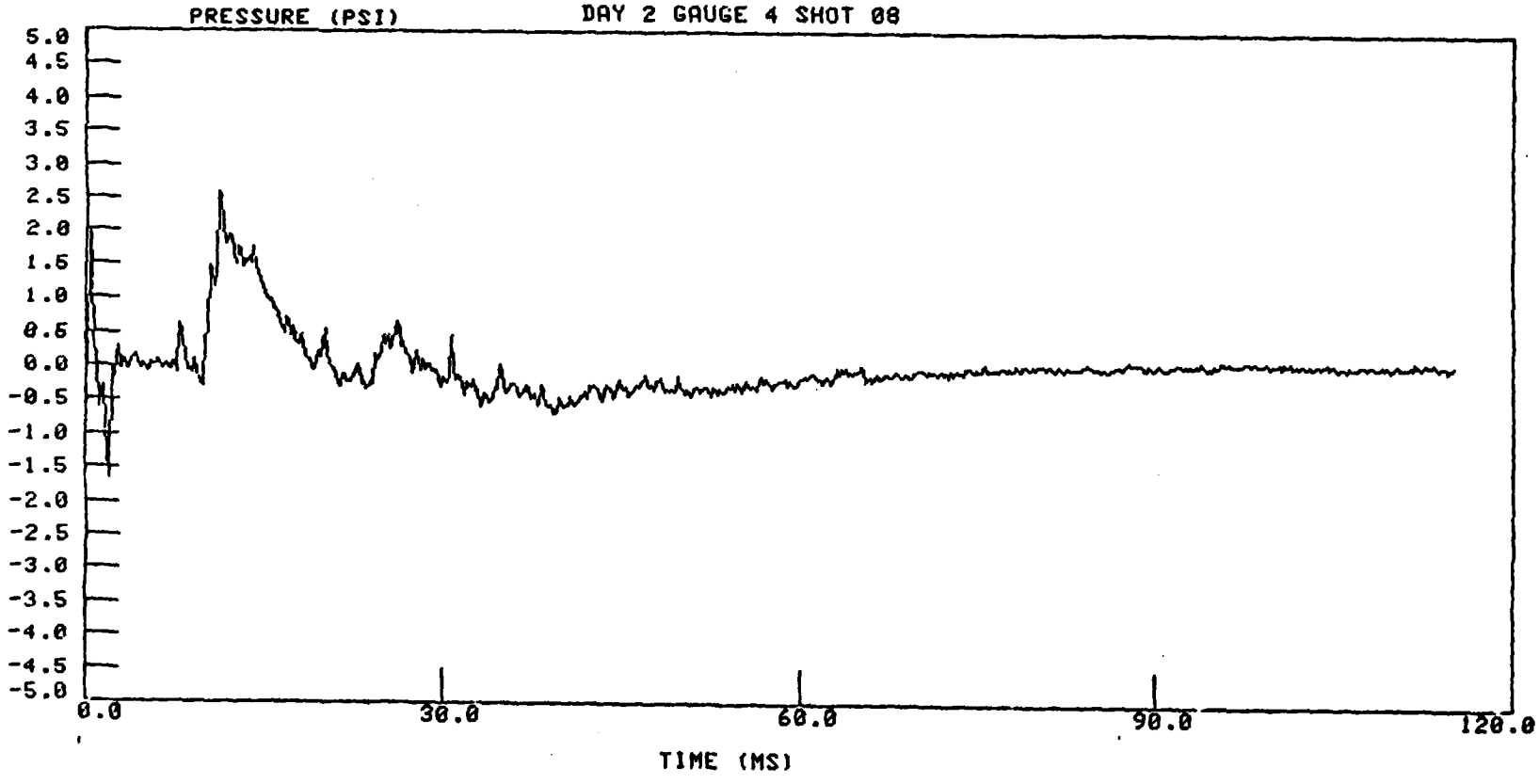

PRESSURE (PSI)
DAY 2 GAUGE 4 SHOT 08
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
-4.5
-5.0
0.0
30.0
60.0
90.0
120.0
TIME (MS)

Figure 7-3

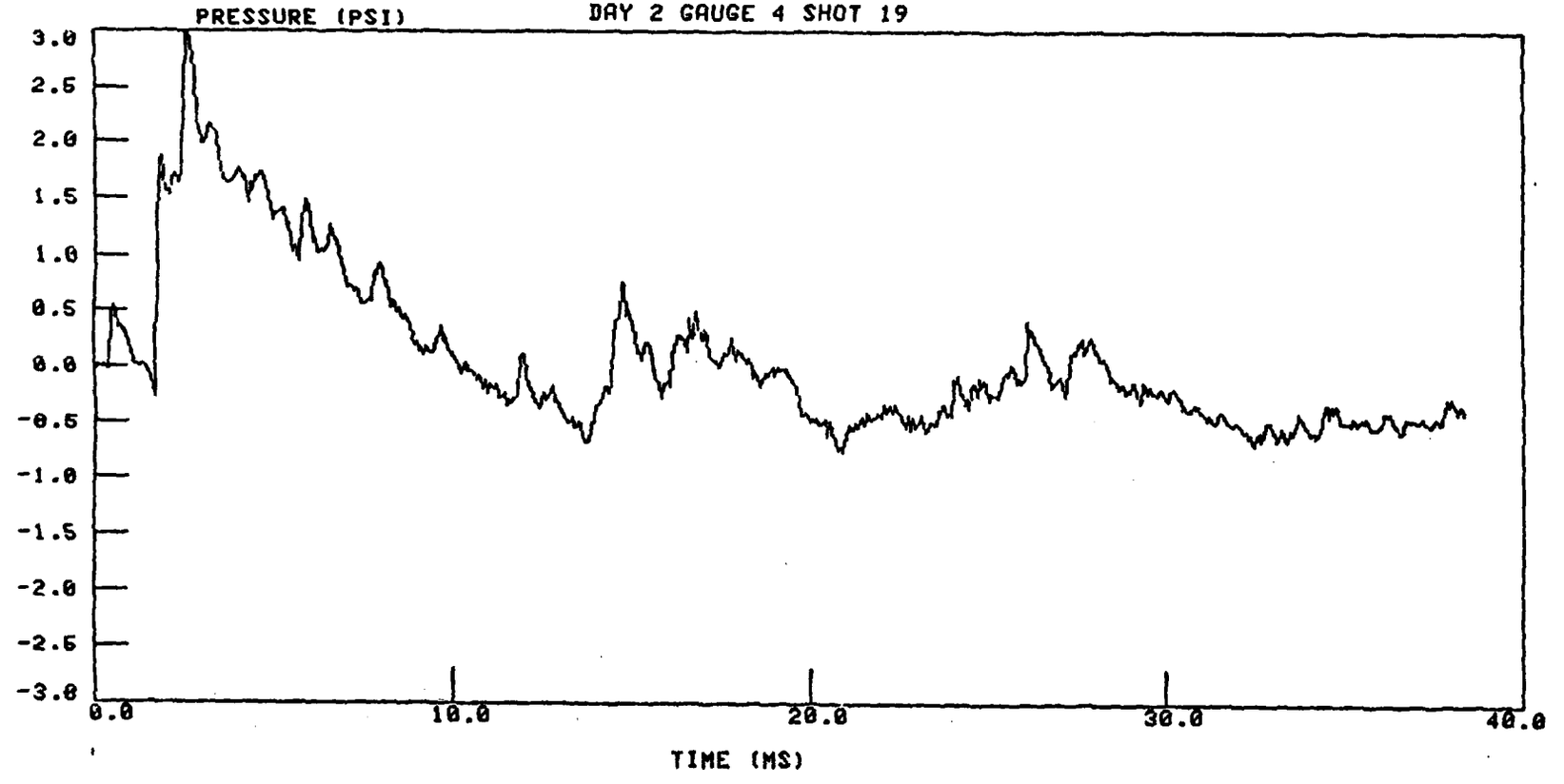

PRESSURE (PSI)
DAY 2 GAUGE 4 SHOT 19
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
0.0
10.0
20.0
30.0
40.0
TIME (MS)

Figure 7-4

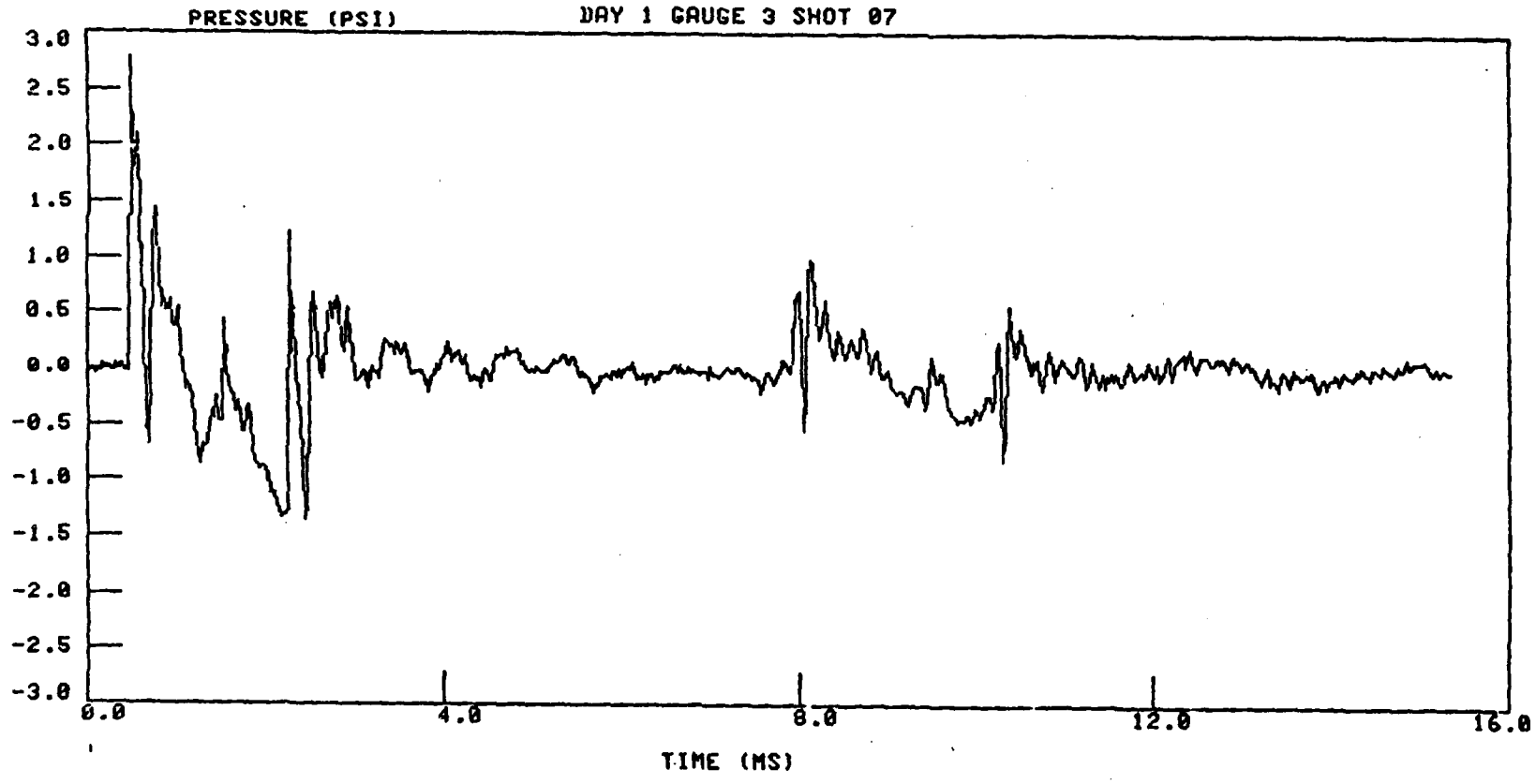

PRESSURE (PSI)
DAY 1 GAUGE 3 SHOT 07
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
0.0
4.0
8.0
12.0
16.0
TIME (MS)

Figure 7-5

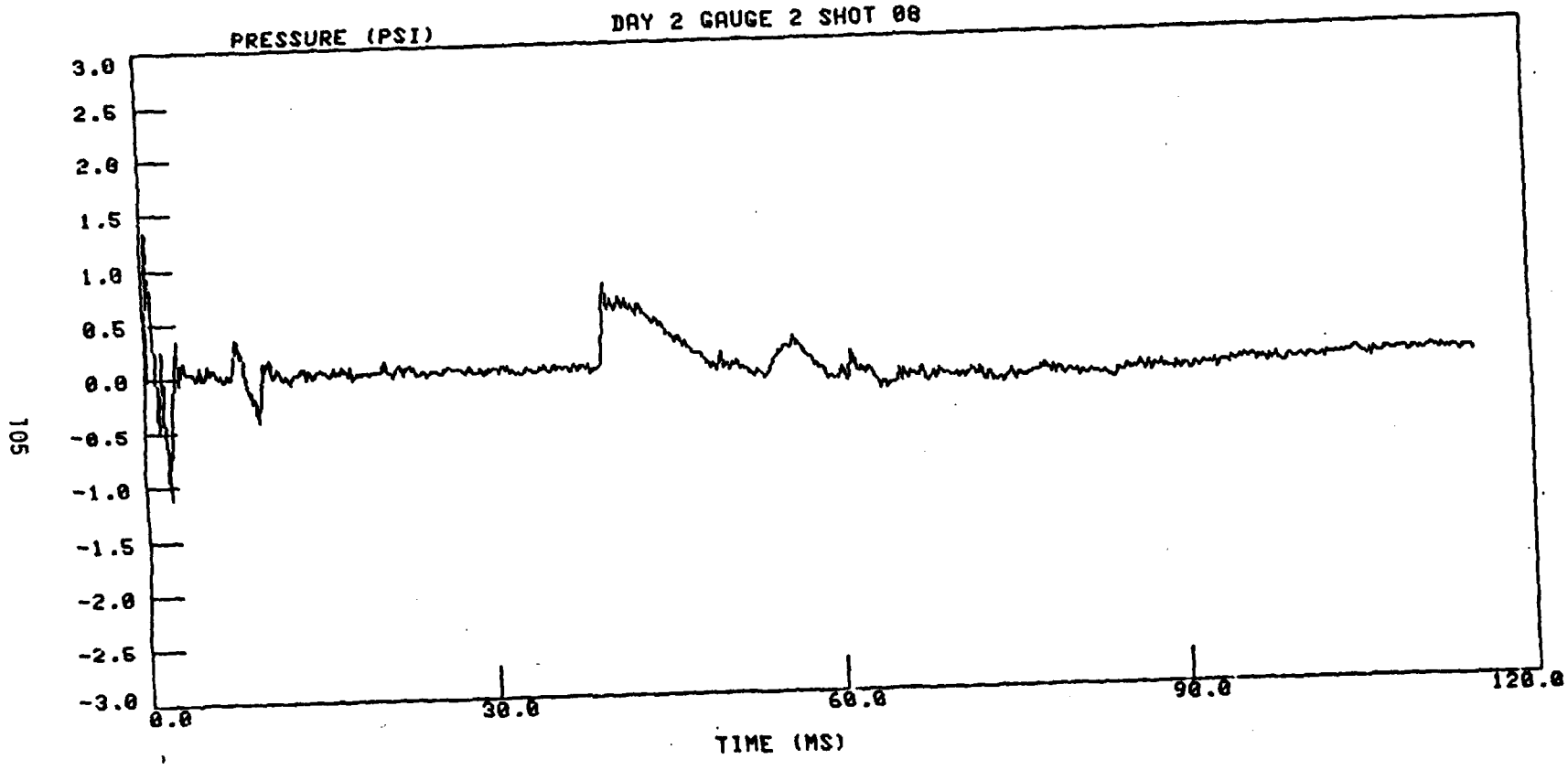

DAY 2 GAUGE 2 SHOT 08
PRESSURE (PSI)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
0.0
30.0
60.0
90.0
120.0
TIME (MS)
105

Figure 7-6

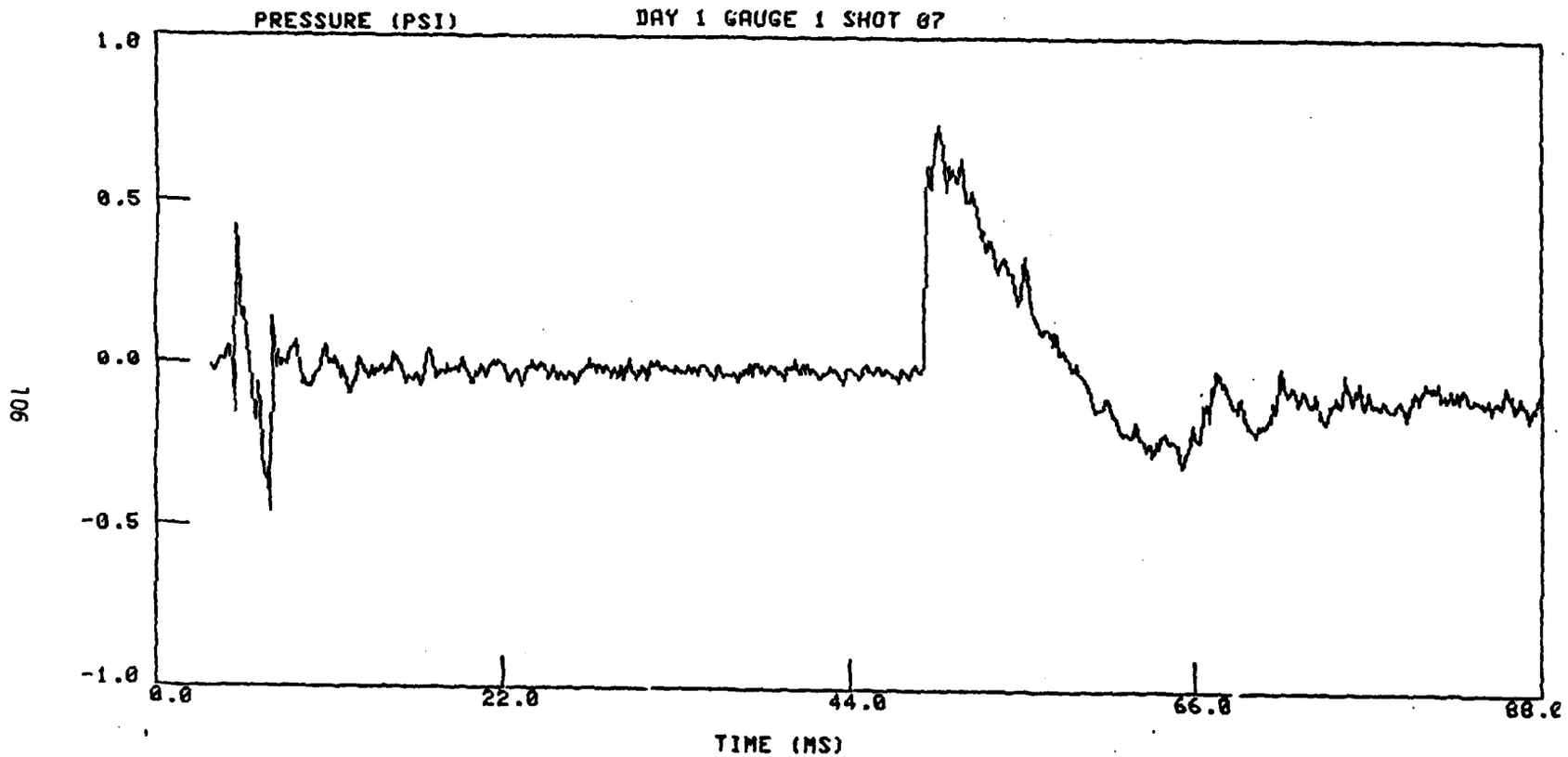

PRESSURE (PSI)
DAY 1 GAUGE 1 SHOT 07
1.0
0.5
0.0
-0.5
-1.0
106
0.0
22.0
44.0
66.0
88.0
TIME (MS)

Figure 7-7

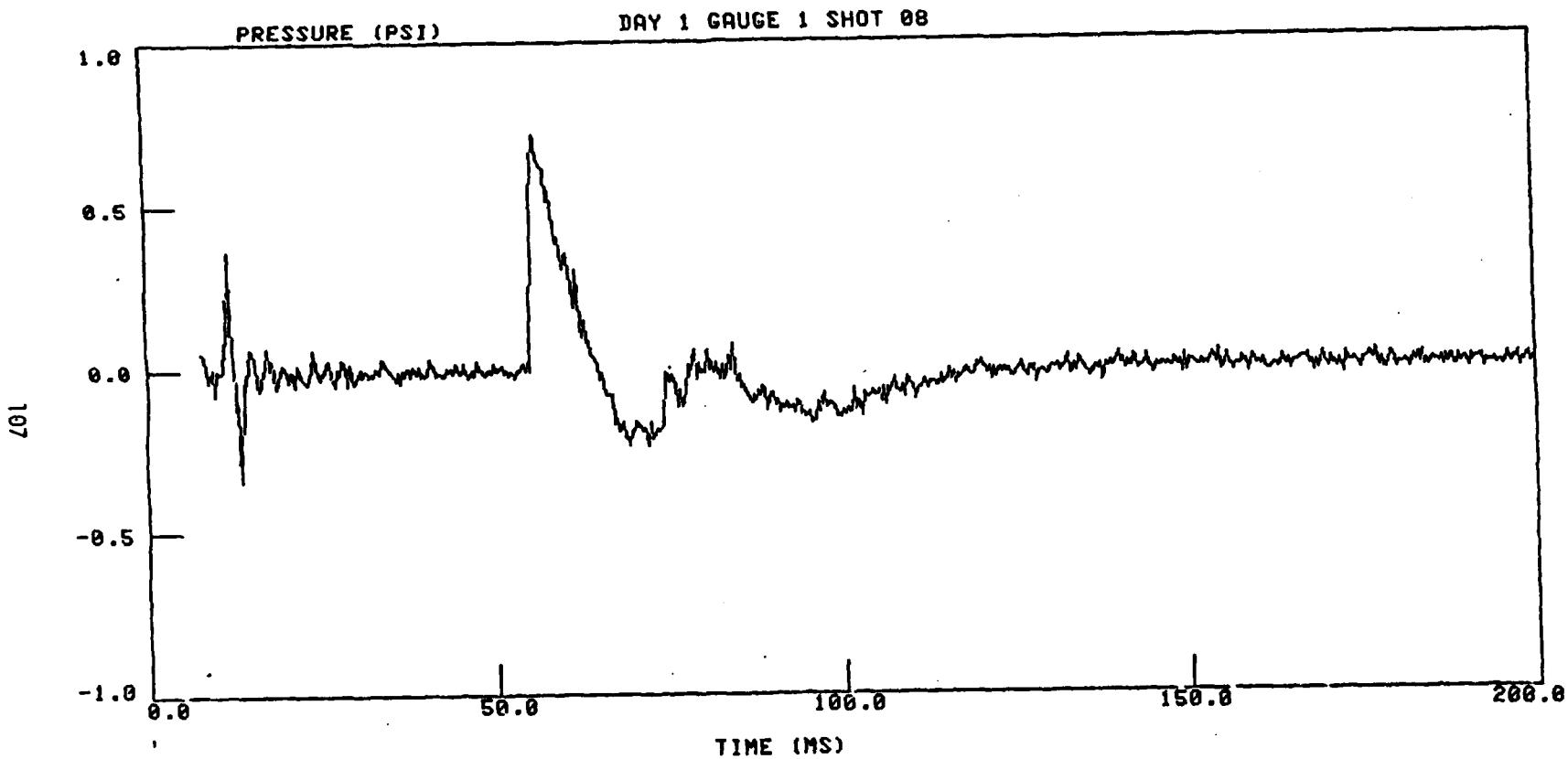

PRESSURE (PSI)
DAY 1 GAUGE 1 SHOT 08
1.0
0.5
0.0
-0.5
-1.0
107
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-8

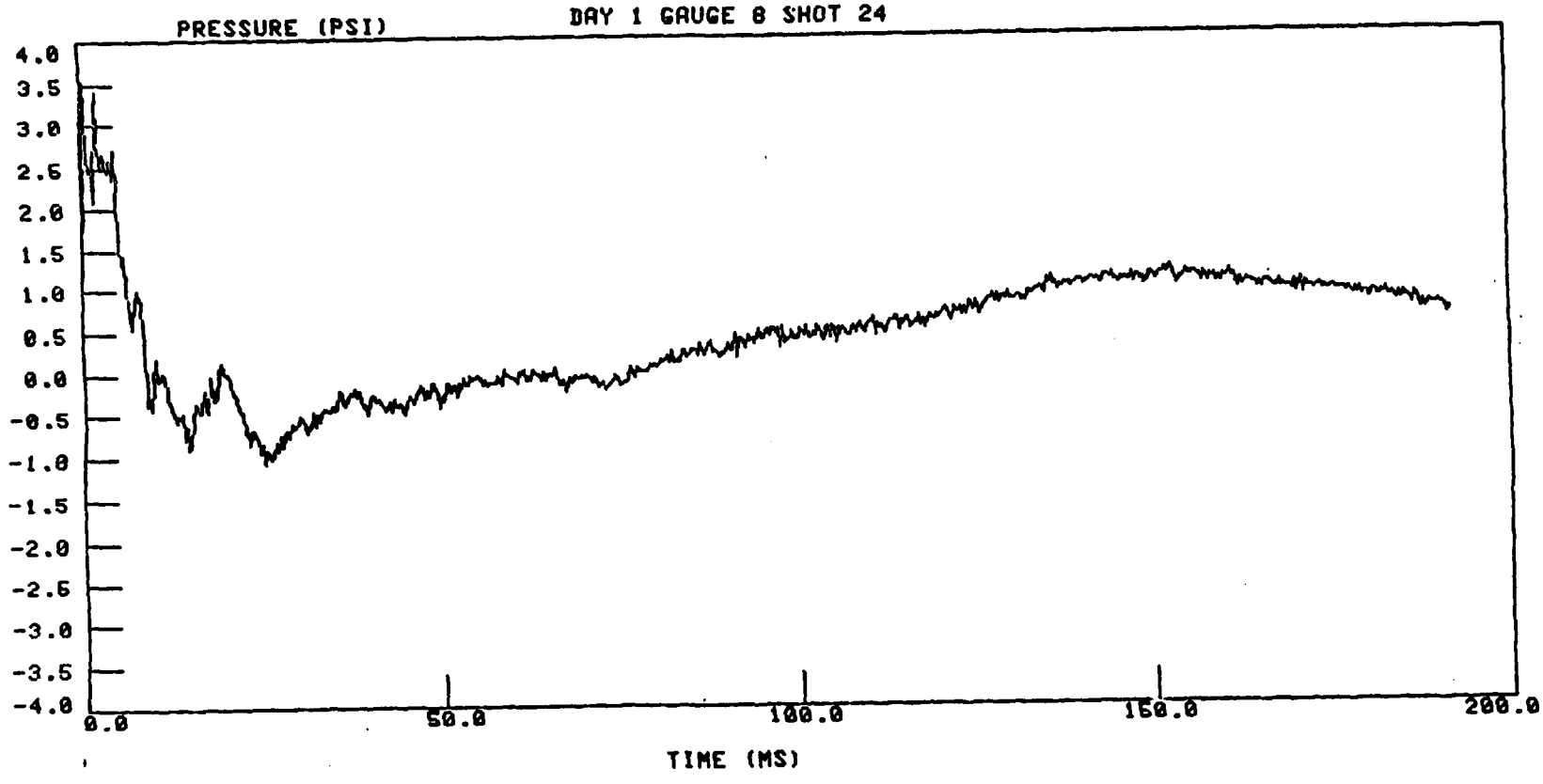

PRESSURE (PSI)
DAY 1 GAUGE 8 SHOT 24
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-9

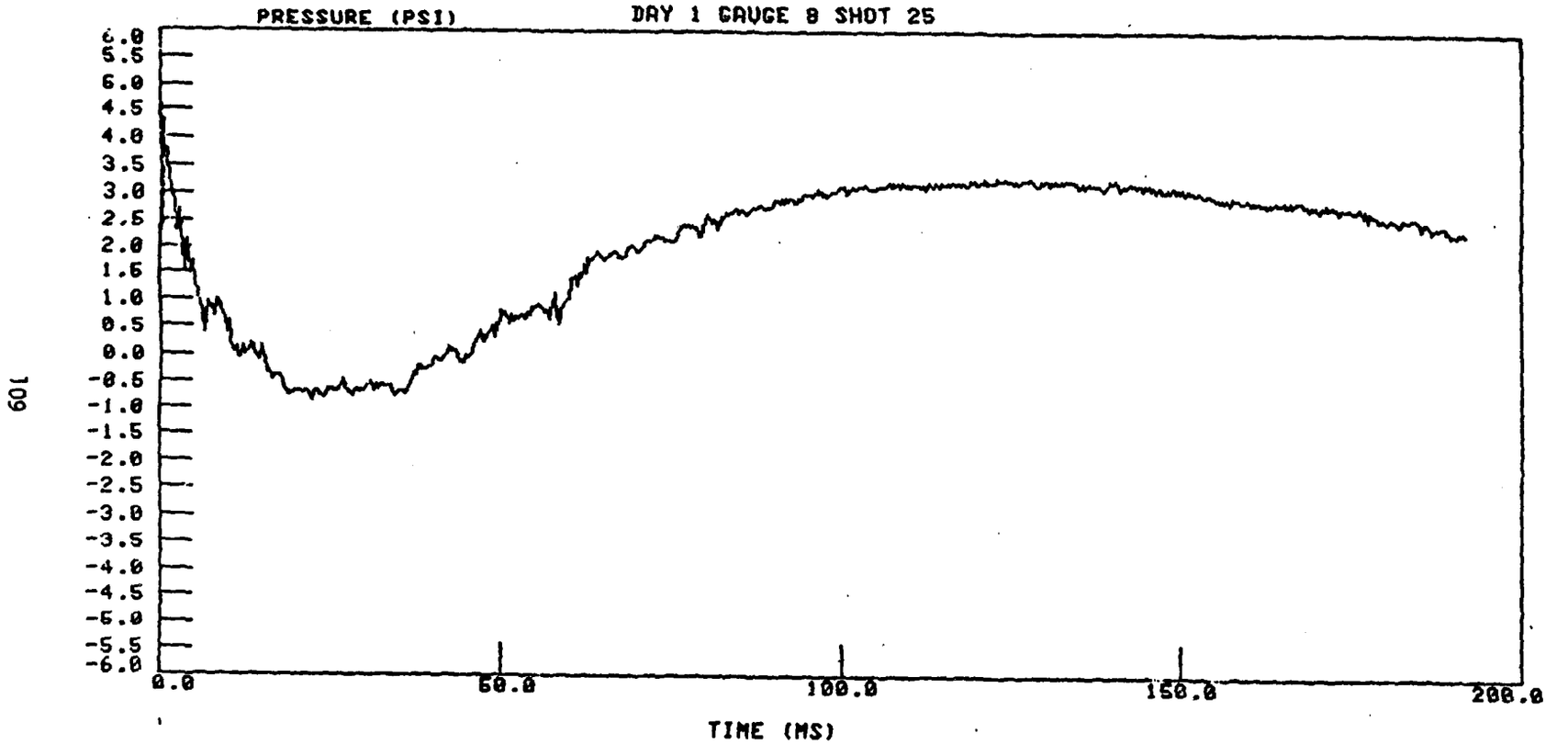

PRESSURE (PSI)
DAY 1 GAUGE 8 SHOT 25
6.0
5.5
6.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
-4.5
-5.0
-5.5
-6.0
109
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-10

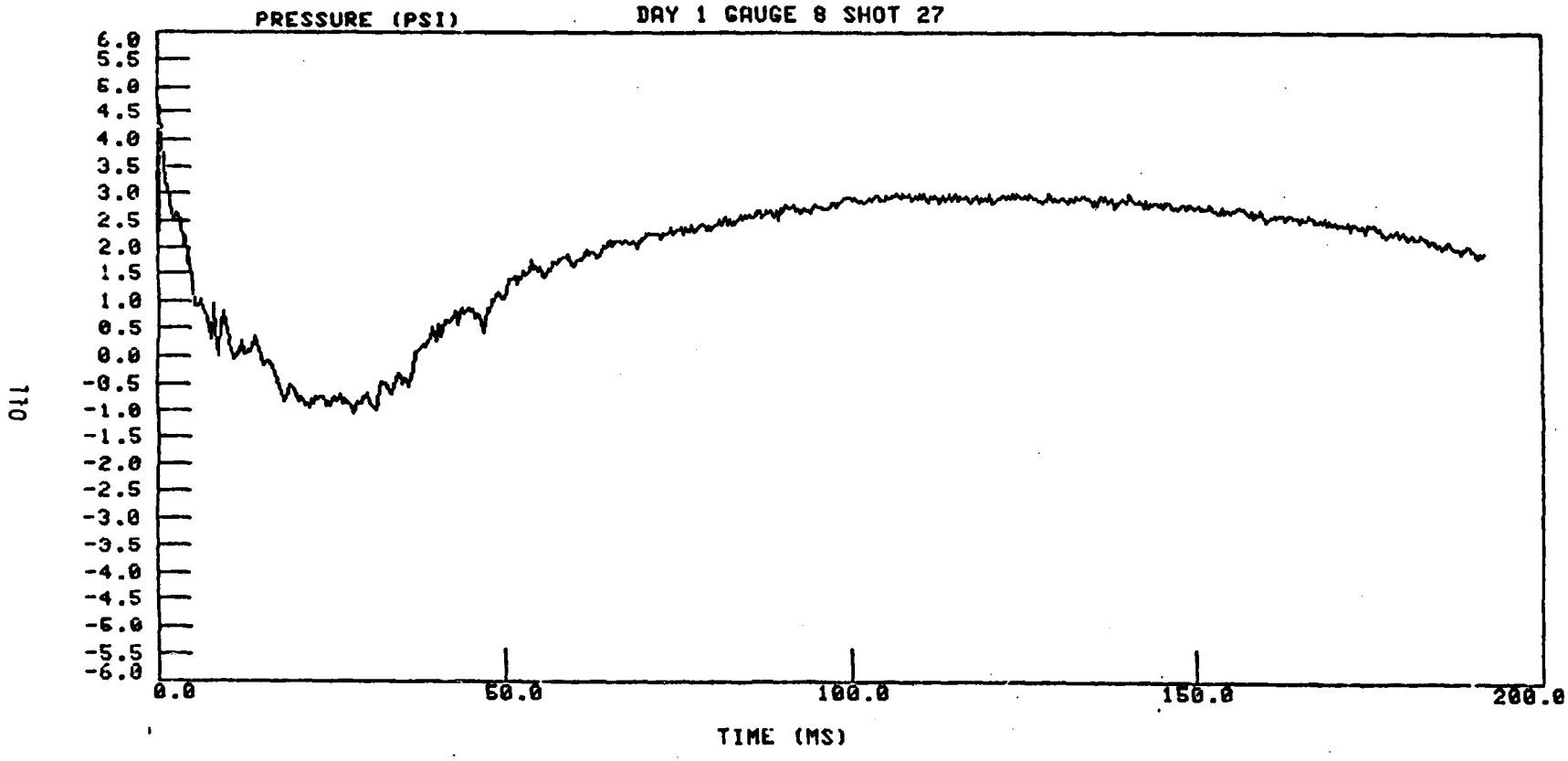

PRESSURE (PSI)
DAY 1 GAUGE 8 SHOT 27
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
-4.5
-5.0
-5.5
-6.0
110
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-11

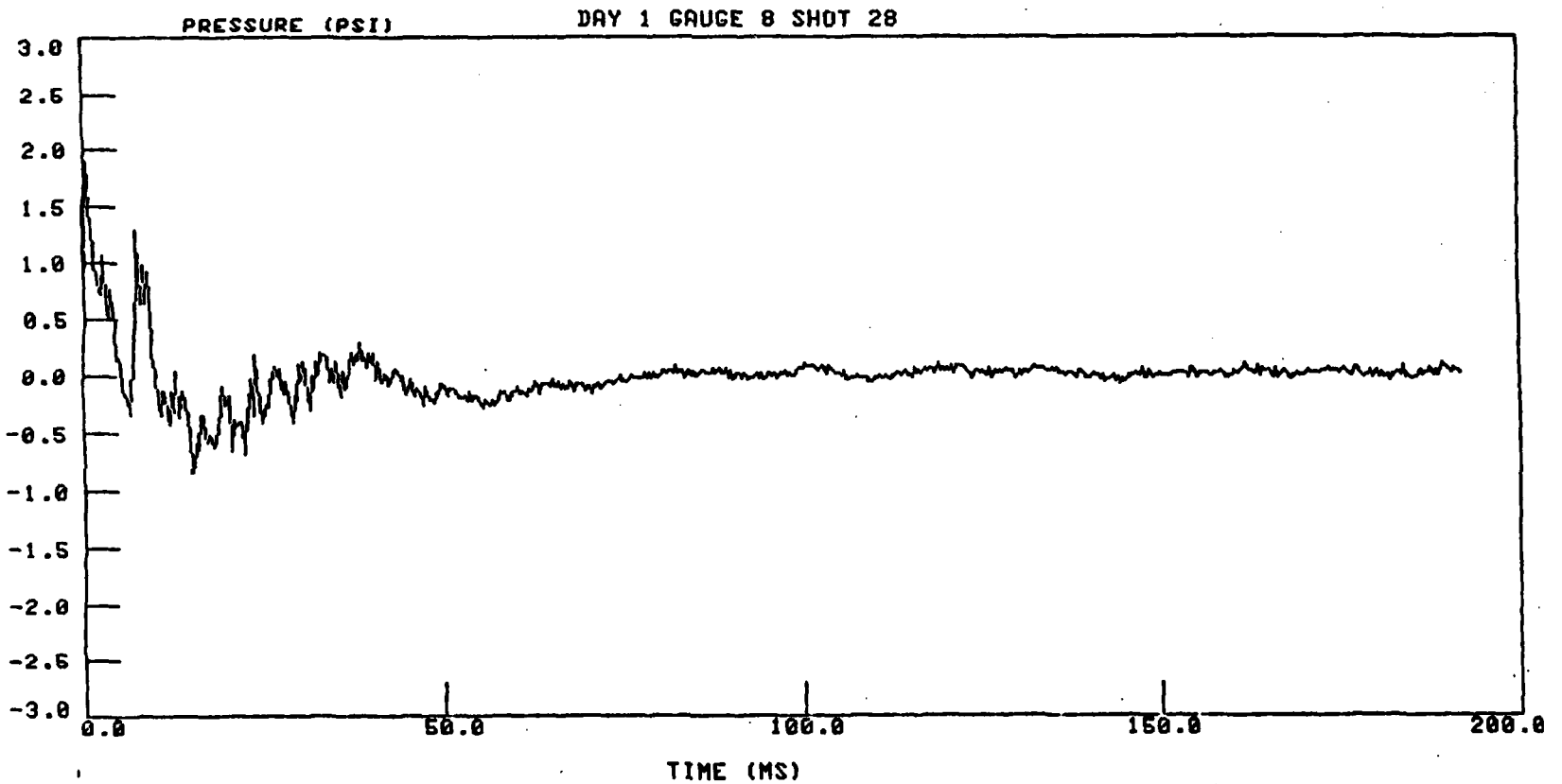

PRESSURE (PSI)
DAY 1 GAUGE 8 SHOT 28
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-12

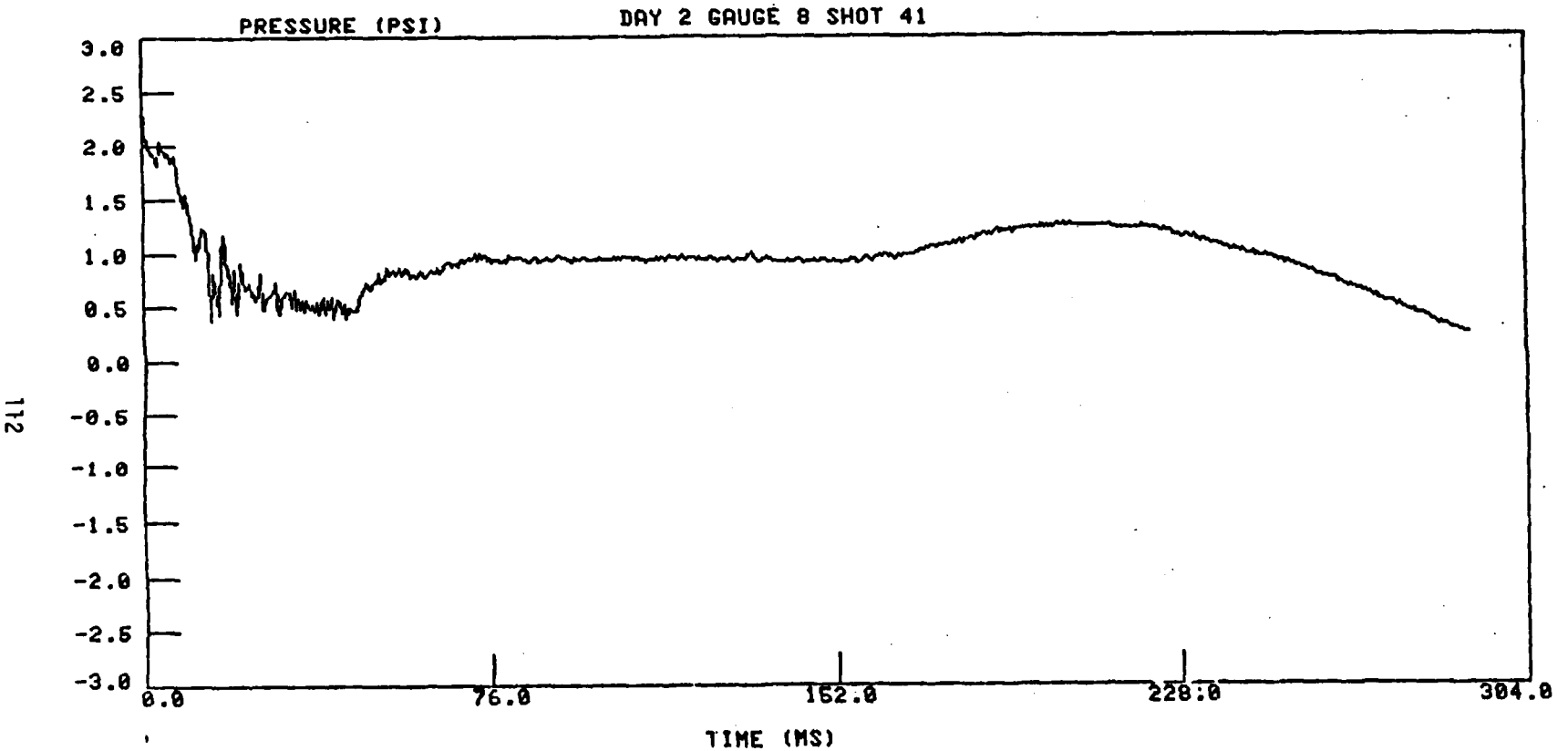

PRESSURE (PSI)
DAY 2 GAUGE 8 SHOT 41
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
0.0
76.0
152.0
228.0
304.0
TIME (MS)

Figure 7-13

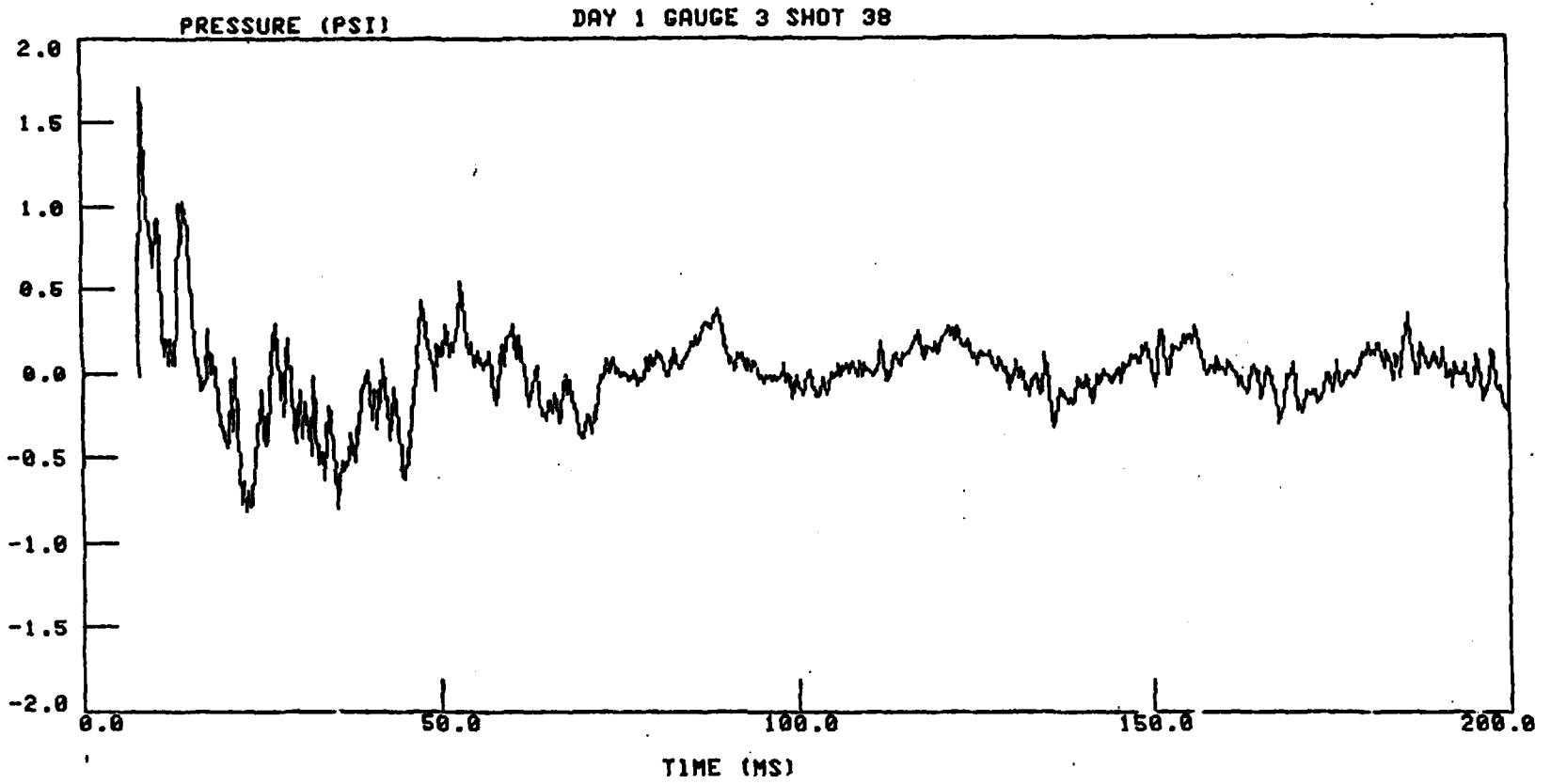

PRESSURE (PSI)
DAY 1 GAUGE 3 SHOT 38
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-14

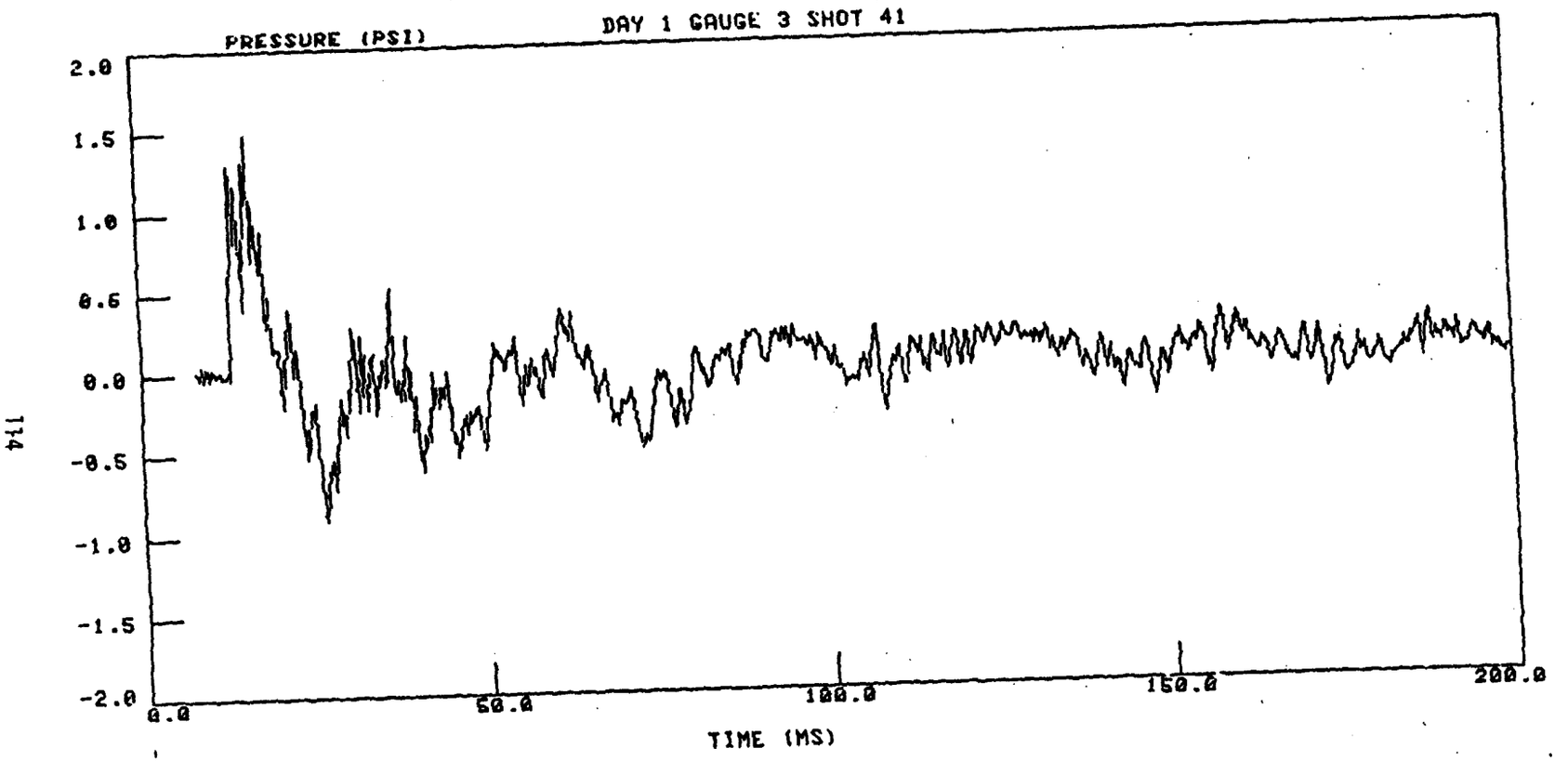

PRESSURE (PSI)
DAY 1 GAUGE 3 SHOT 41
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-15

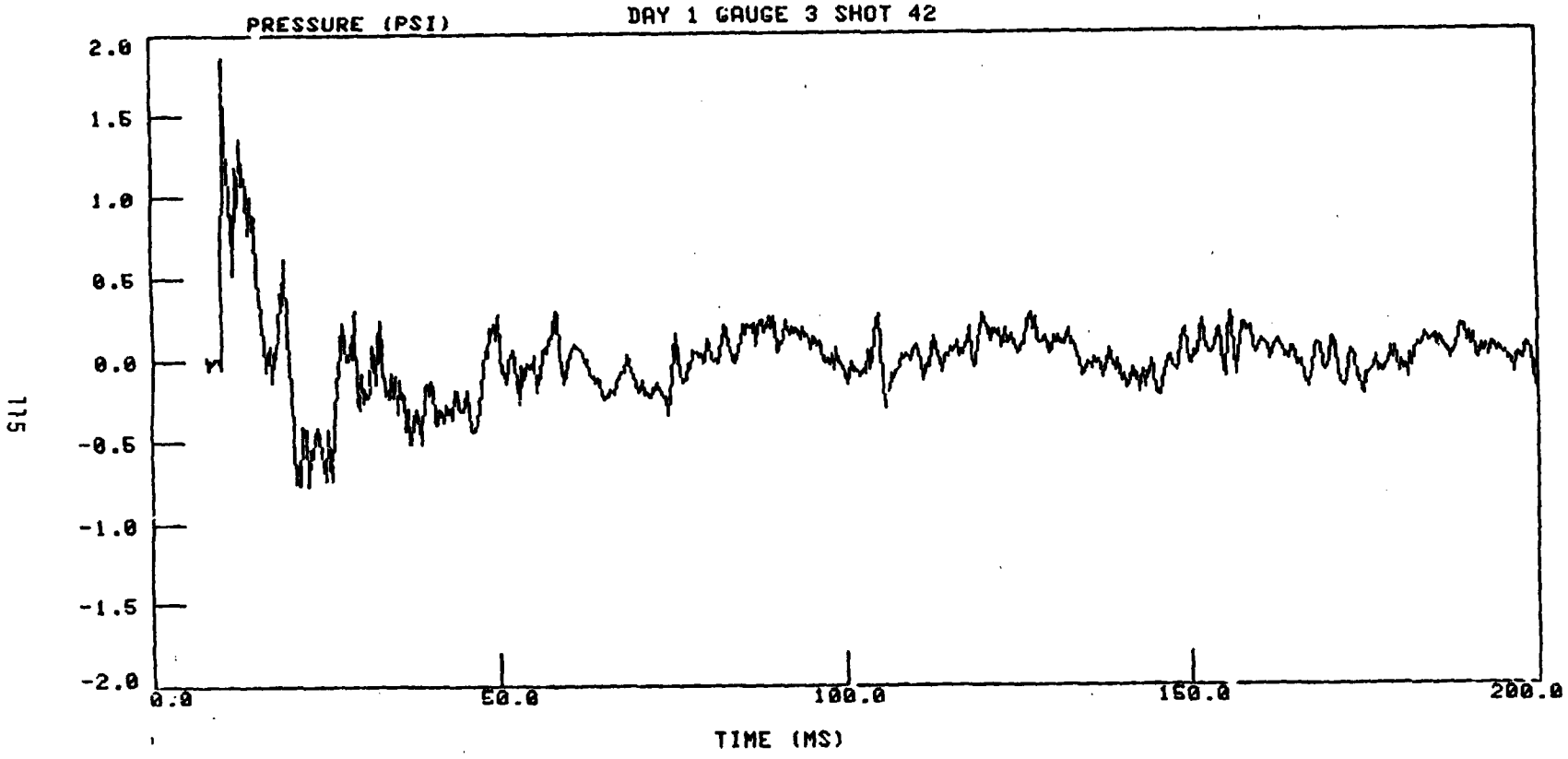

PRESSURE (PSI)
DAY 1 GAUGE 3 SHOT 42
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)
115

Figure 7-16

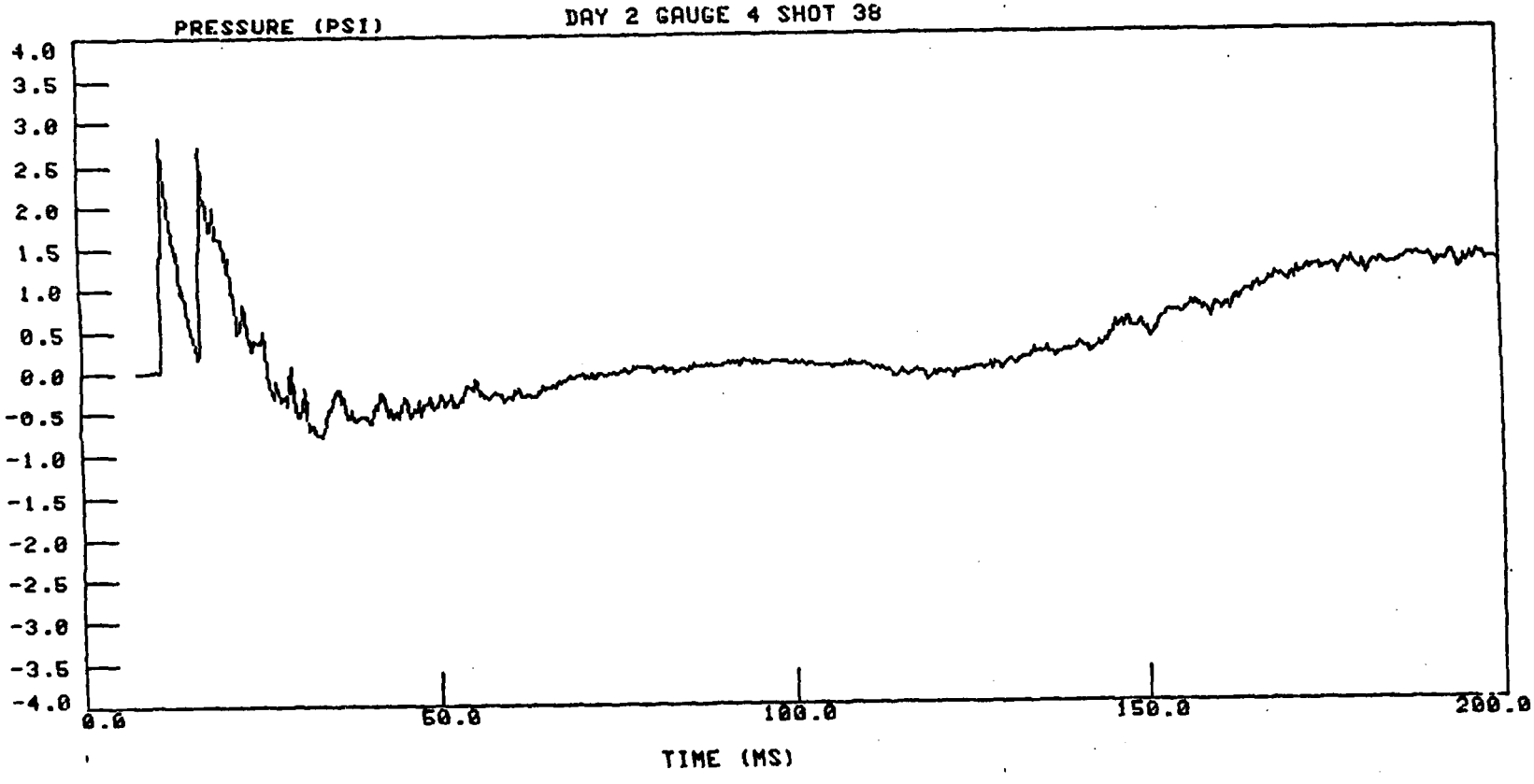

PRESSURE (PSI)
DAY 2 GAUGE 4 SHOT 38
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-17

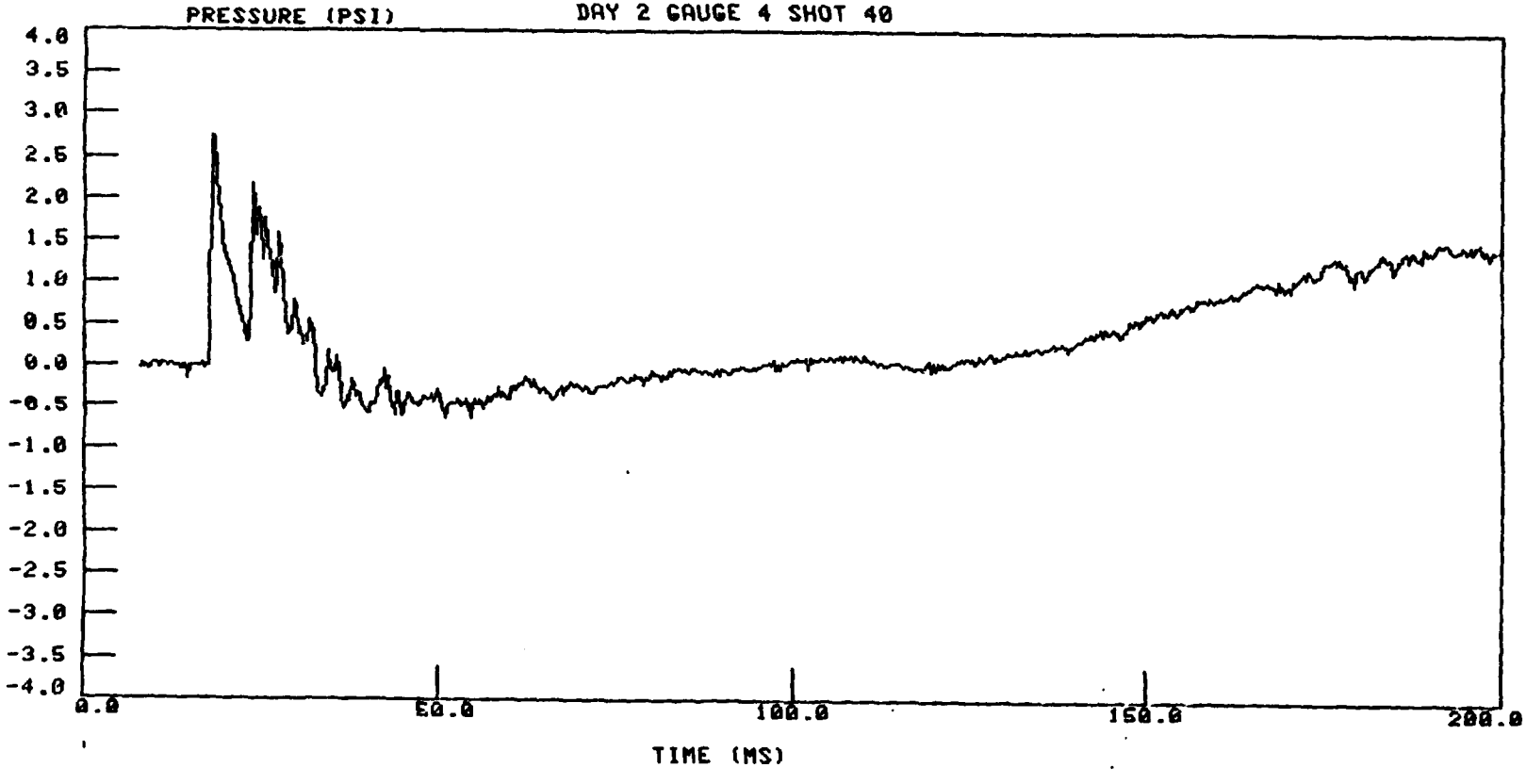

PRESSURE (PSI)
DAY 2 GAUGE 4 SHOT 40
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-18

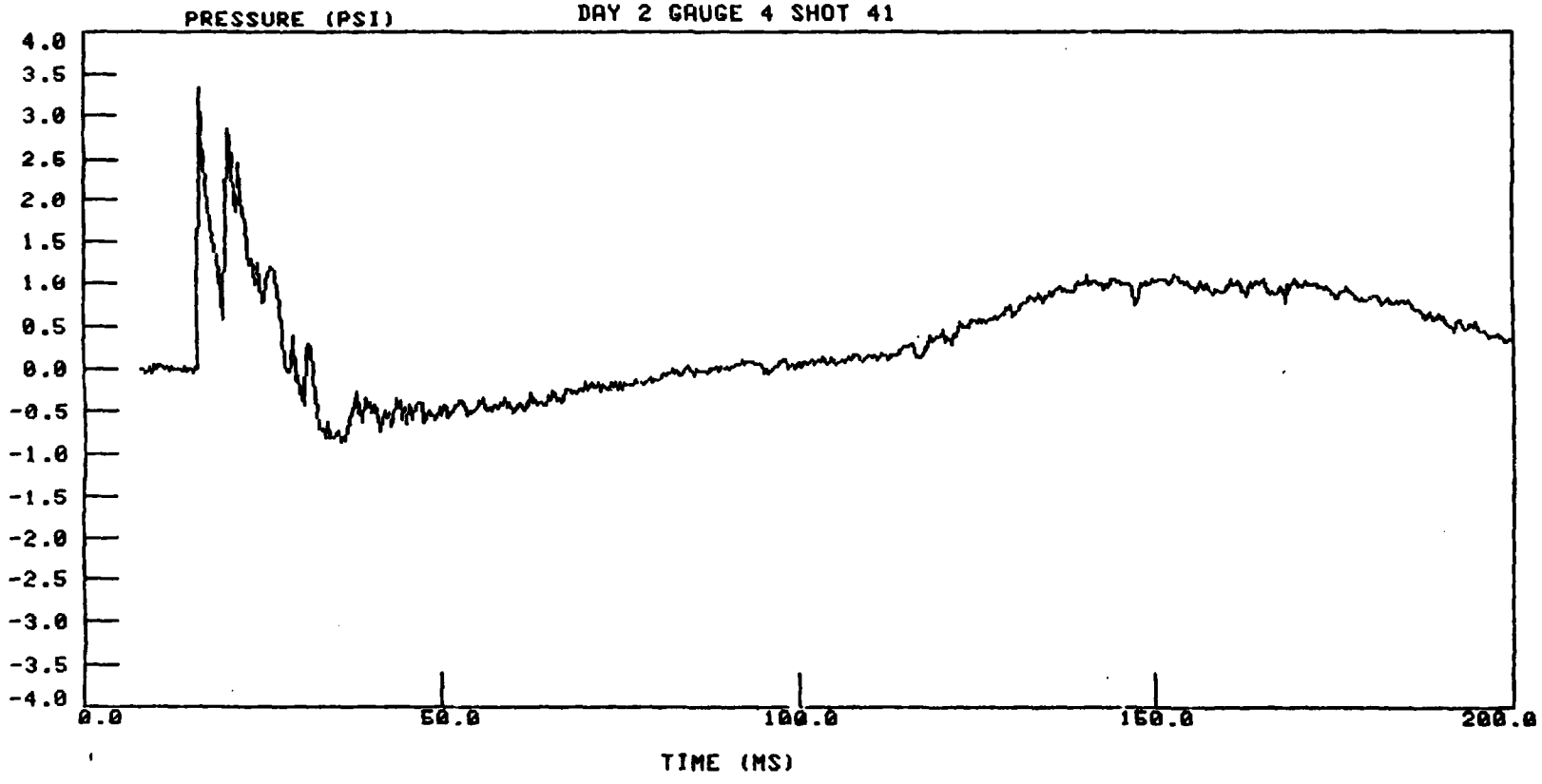

PRESSURE (PSI)
DAY 2 GAUGE 4 SHOT 41
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-19

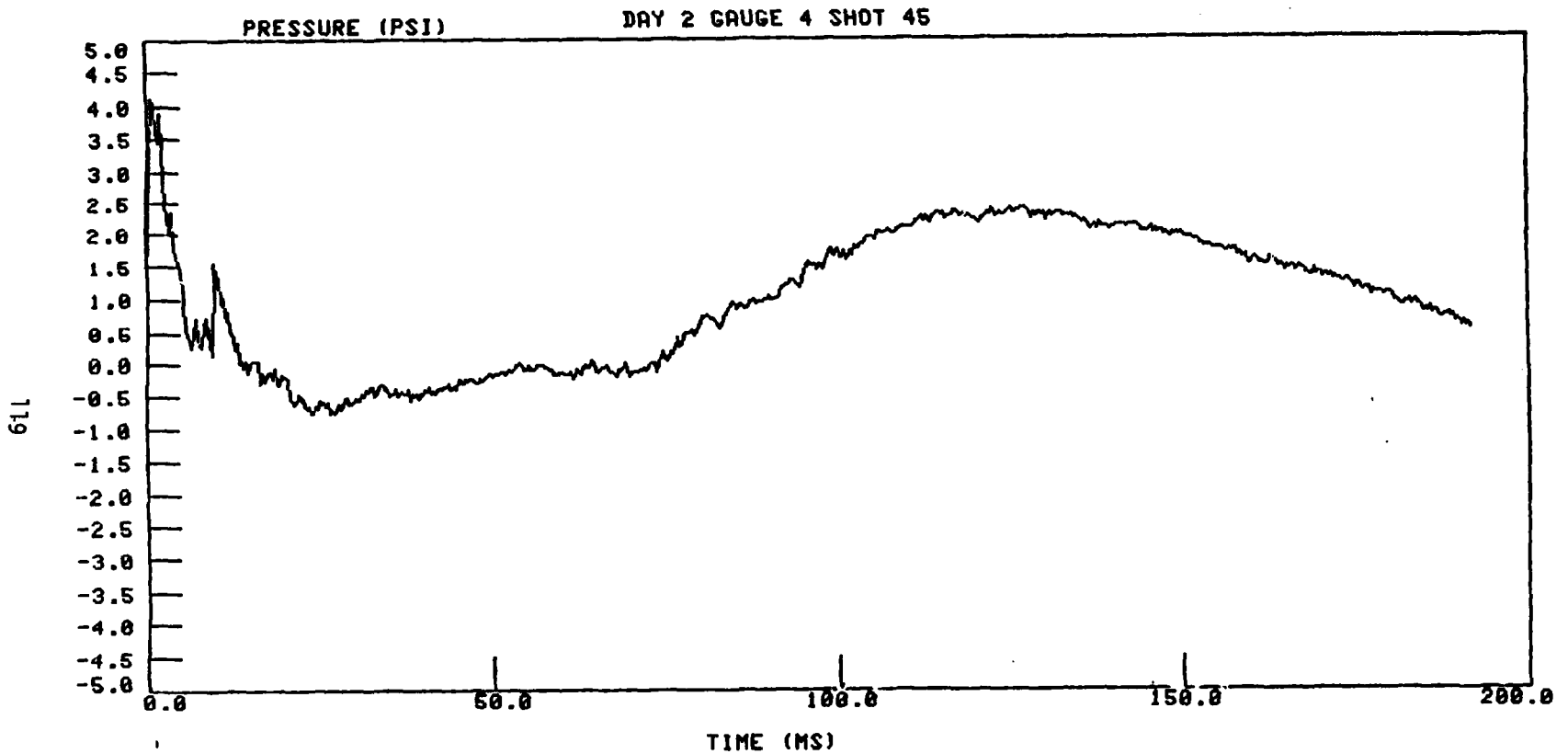

PRESSURE (PSI)
DAY 2 GAUGE 4 SHOT 45
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
-4.5
-5.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)
611

Figure 7-20

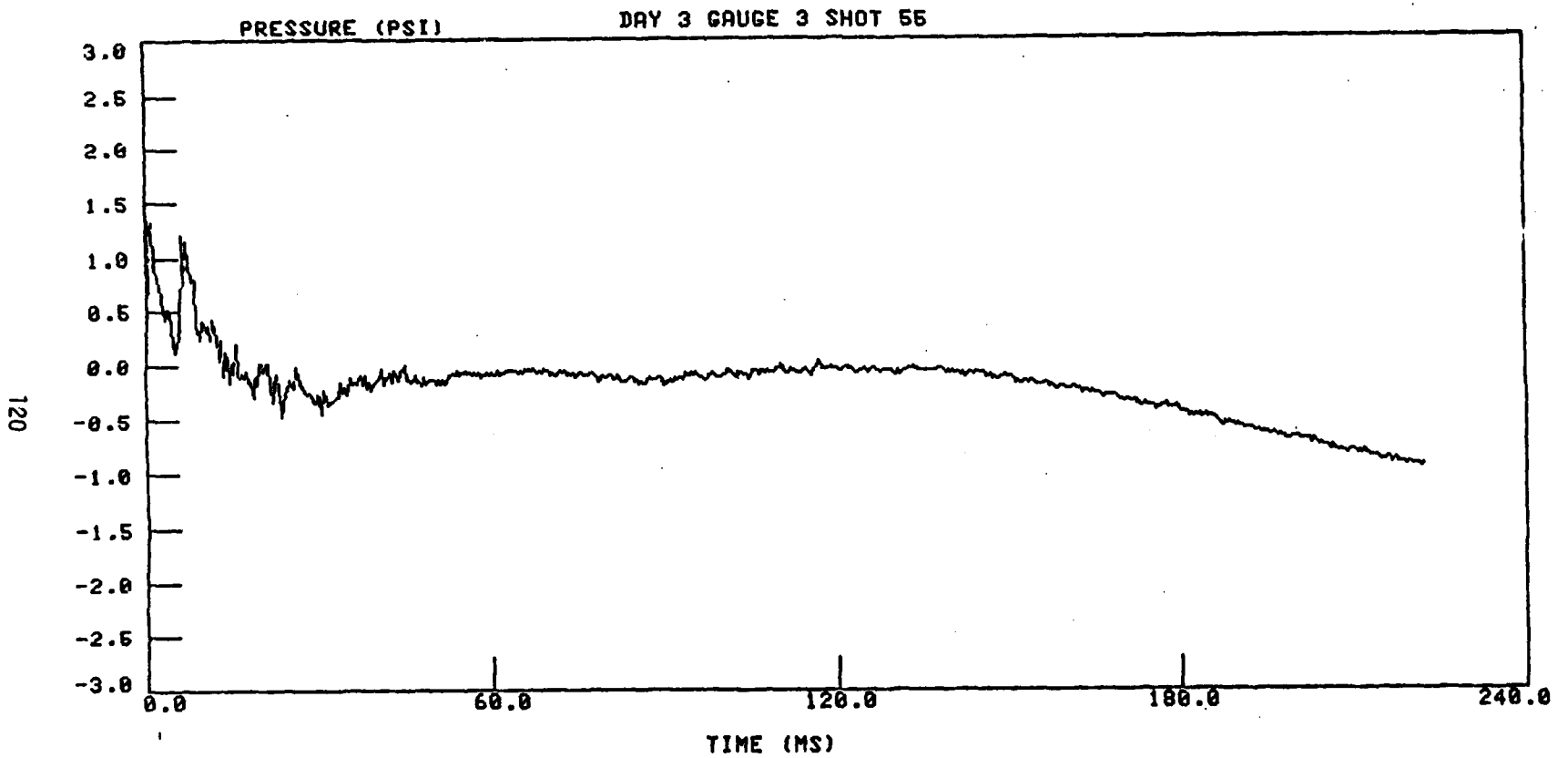

PRESSURE (PSI)
DAY 3 GAUGE 3 SHOT 55
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
0.0
60.0
120.0
180.0
240.0
TIME (MS)
120

Figure 7-21

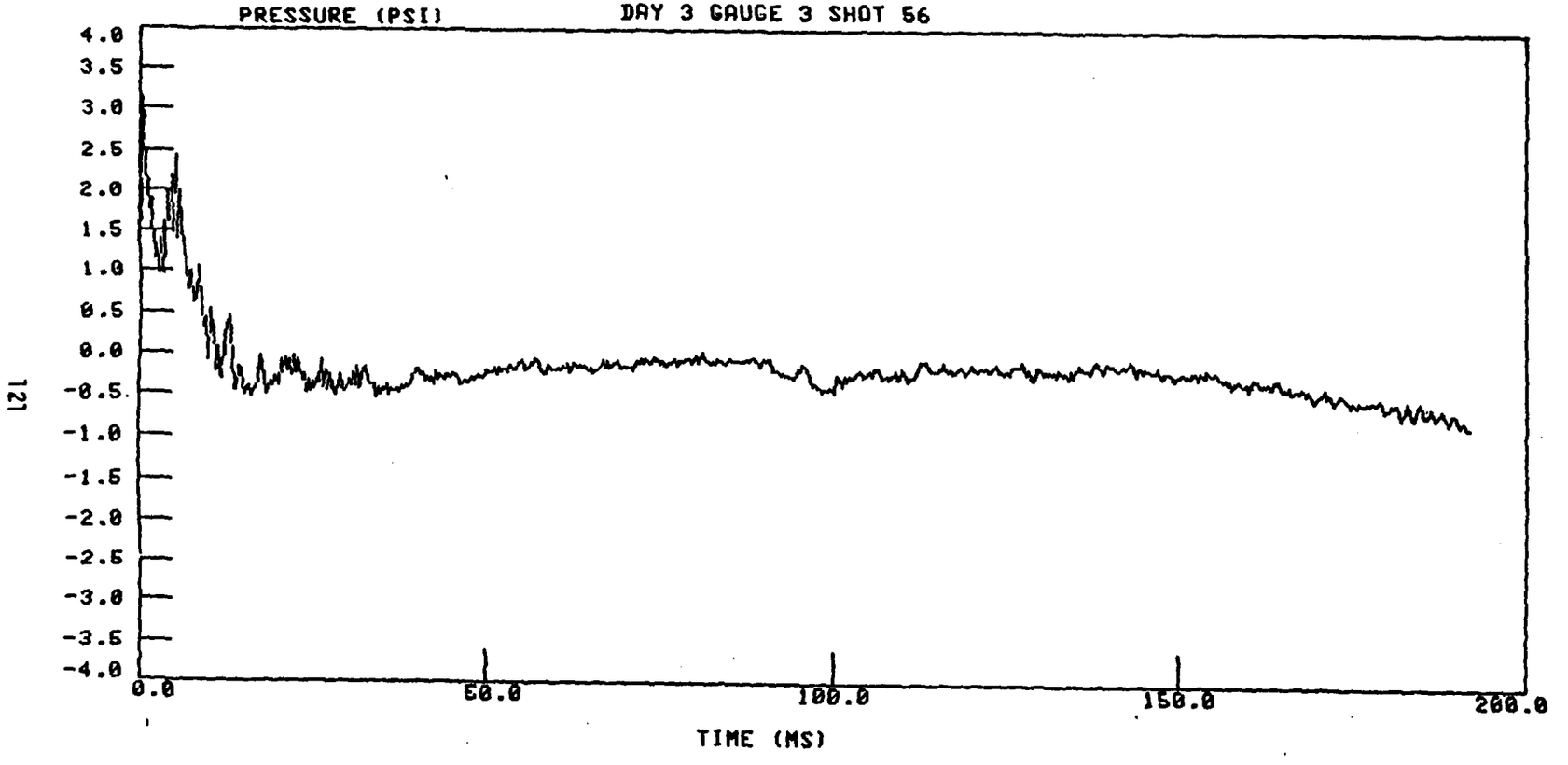

PRESSURE (PSI)
DAY 3 GAUGE 3 SHOT 56
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-22

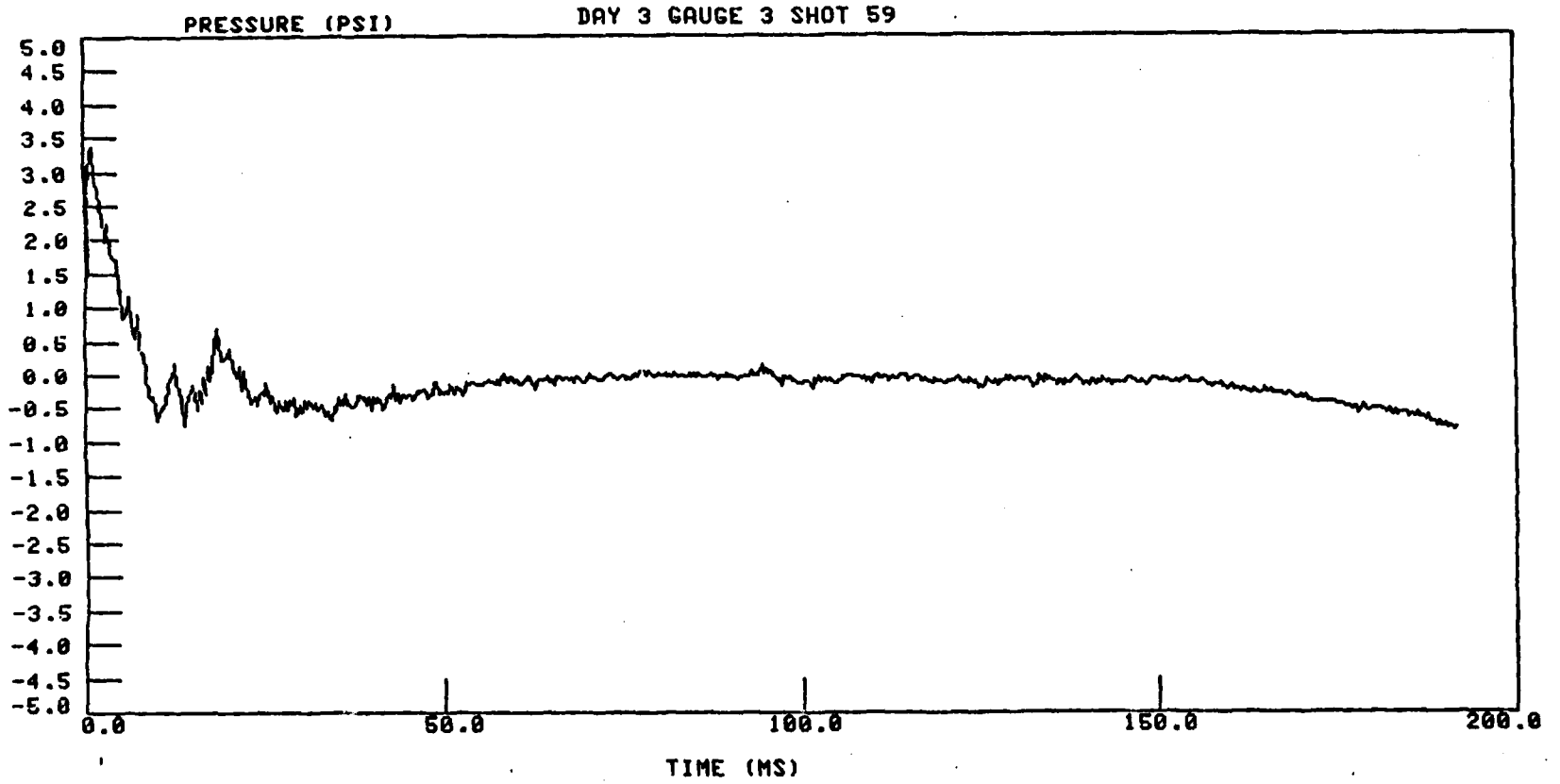

PRESSURE (PSI)
DAY 3 GAUGE 3 SHOT 59
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
-4.5
-5.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-23

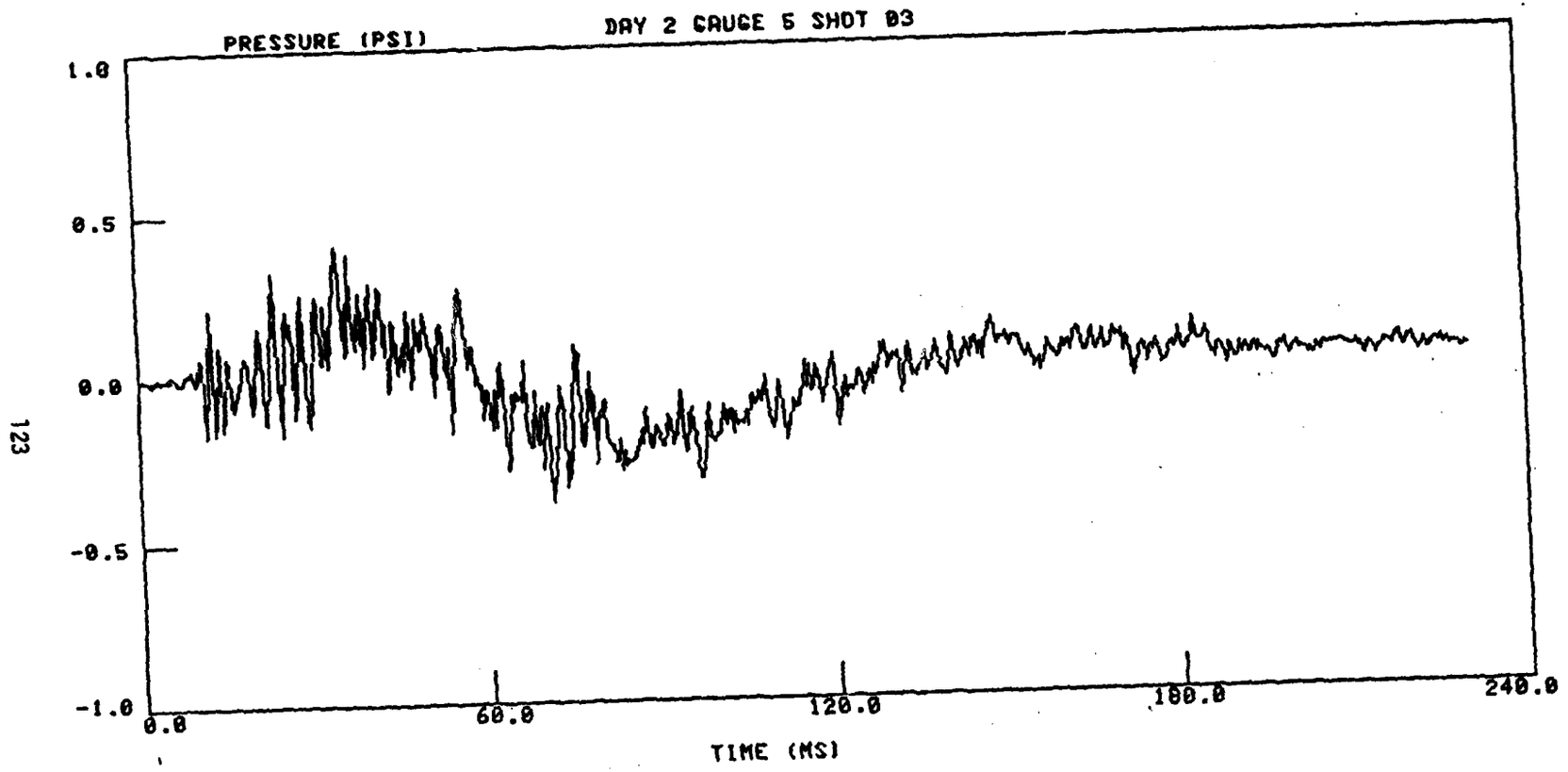

PRESSURE (PSI)
DAY 2 GAUGE 5 SHOT 03
1.0
0.5
0.0
-0.5
-1.0
123
0.0
60.0
120.0
180.0
240.0
TIME (MS)

Figure 7-24

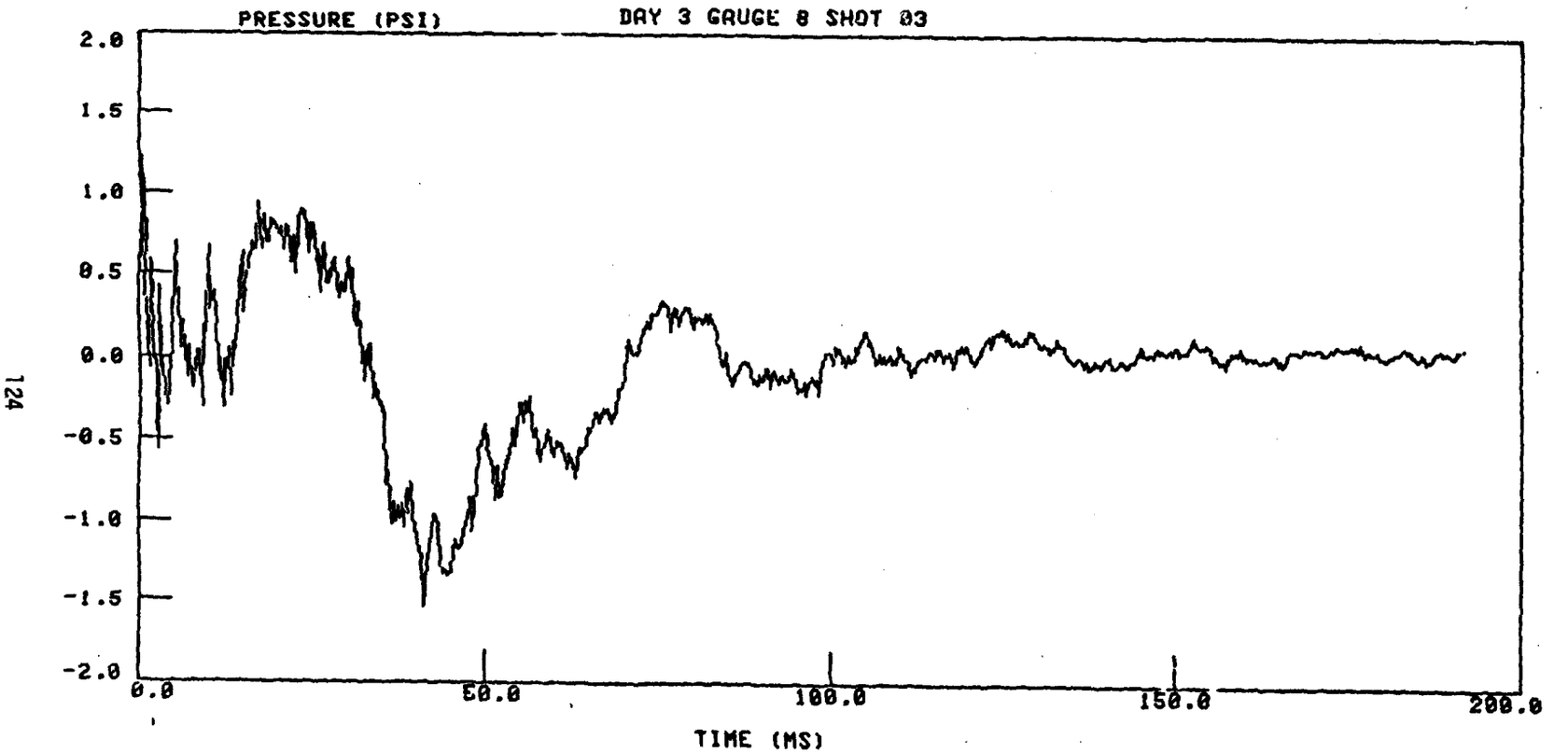

PRESSURE (PSI)
DAY 3 GAUGE 8 SHOT 03
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)
124

Figure 7-25

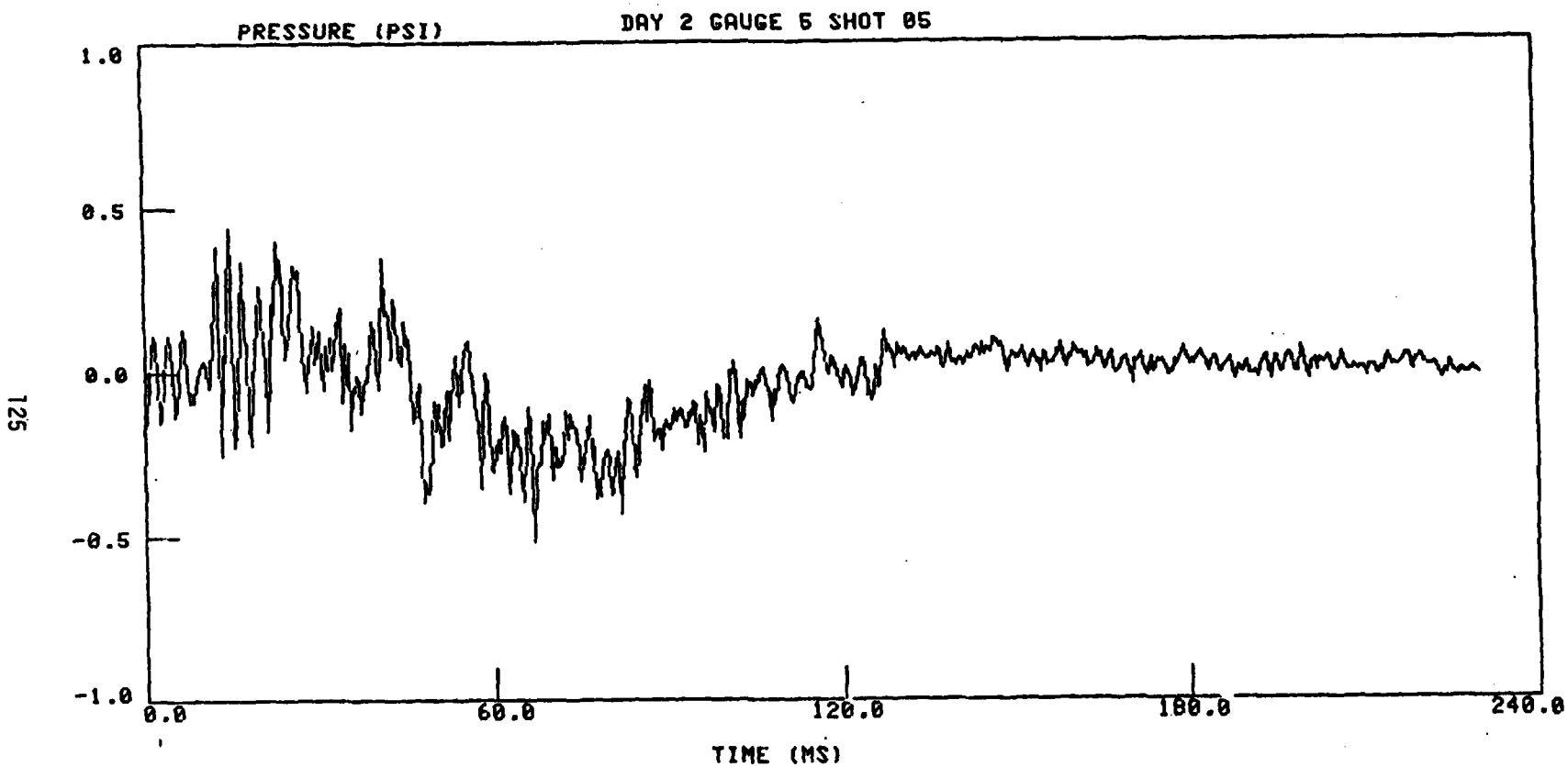

PRESSURE (PSI)
DAY 2 GAUGE 5 SHOT 05
1.0
0.5
0.0
-0.5
-1.0
125
0.0
60.0
120.0
180.0
240.0
TIME (MS)

Figure 7-26

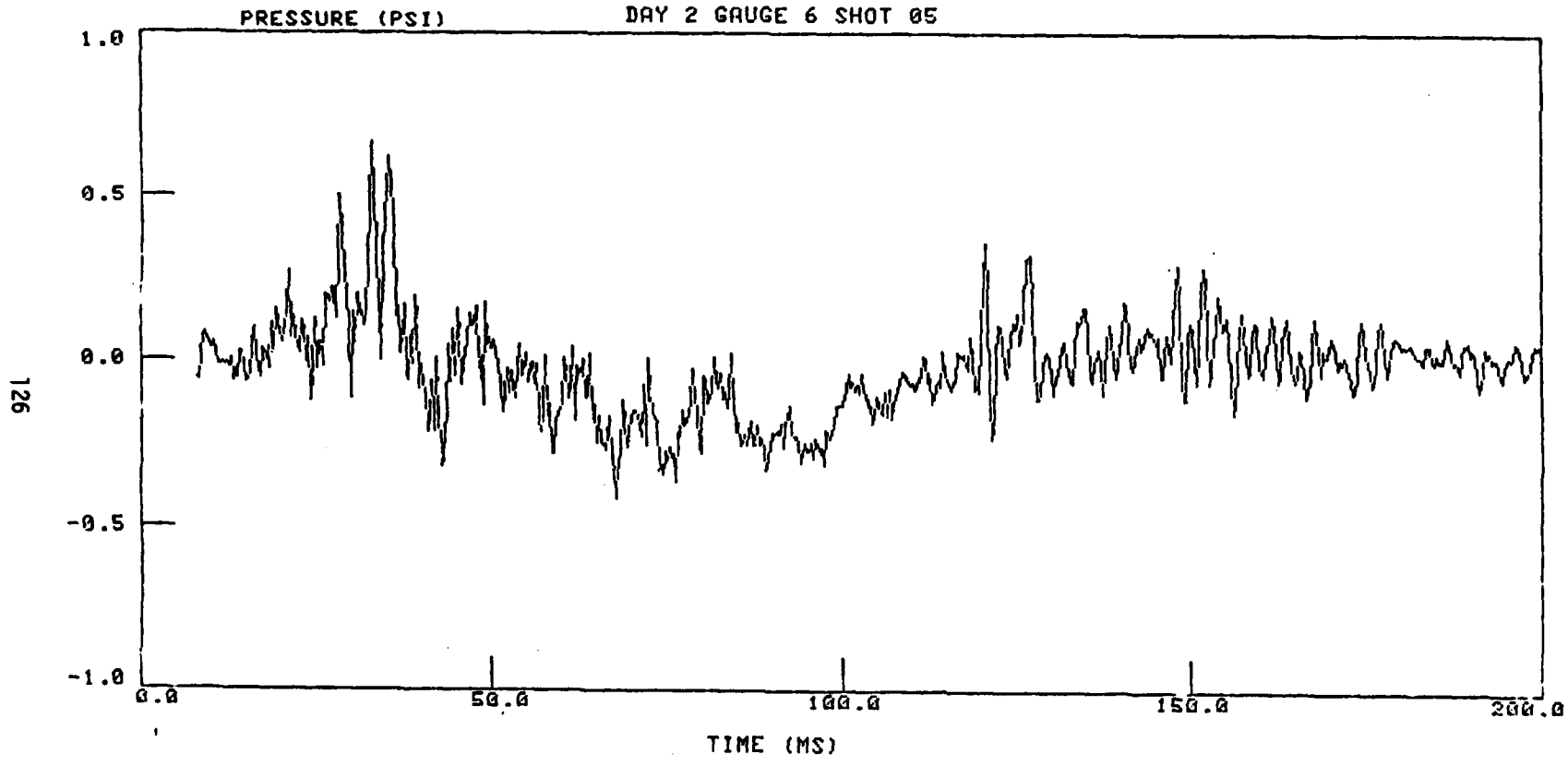

PRESSURE (PSI)
DAY 2 GAUGE 6 SHOT 05
1.0
0.5
0.0
-0.5
-1.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-27

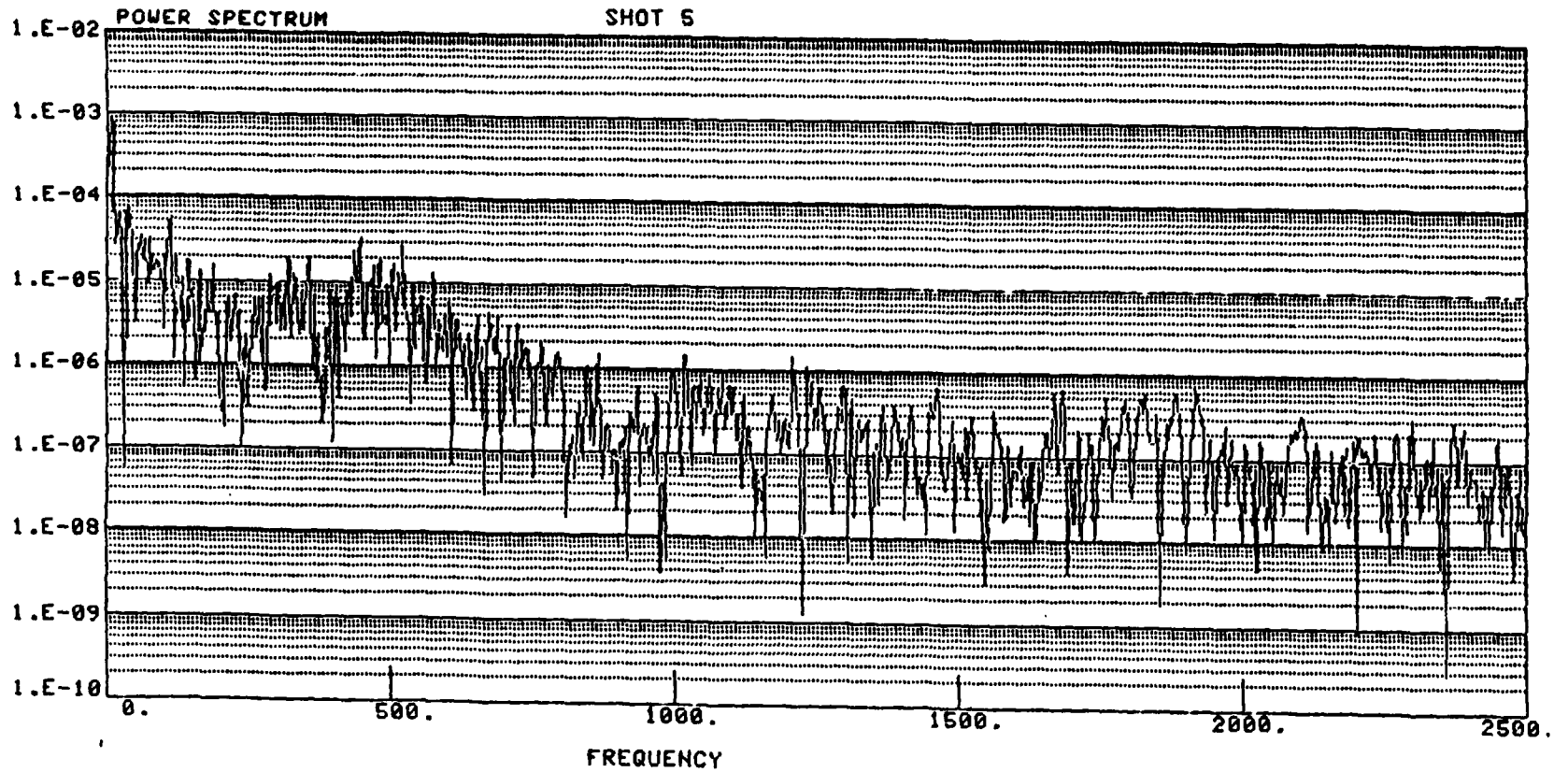

POWER SPECTRUM
SHOT 5
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
1.E-08
1.E-09
1.E-10
0.
500.
1000.
1500.
2000.
2500.
FREQUENCY

Figure 7-28

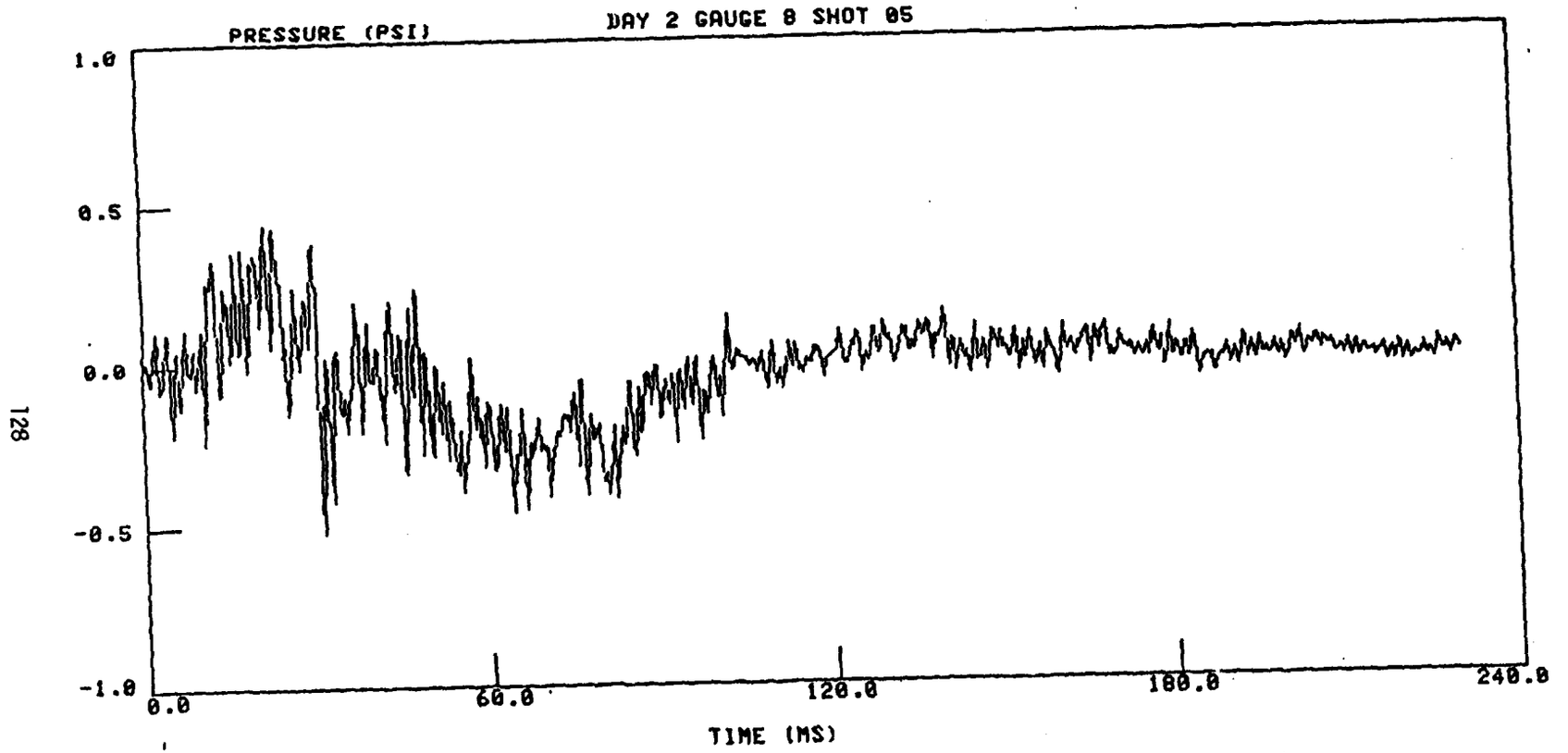

PRESSURE (PSI)
DAY 2 GAUGE 8 SHOT 05
1.0
0.5
0.0
-0.5
-1.0
128
0.0
60.0
120.0
180.0
240.0
TIME (MS)

Figure 7-29

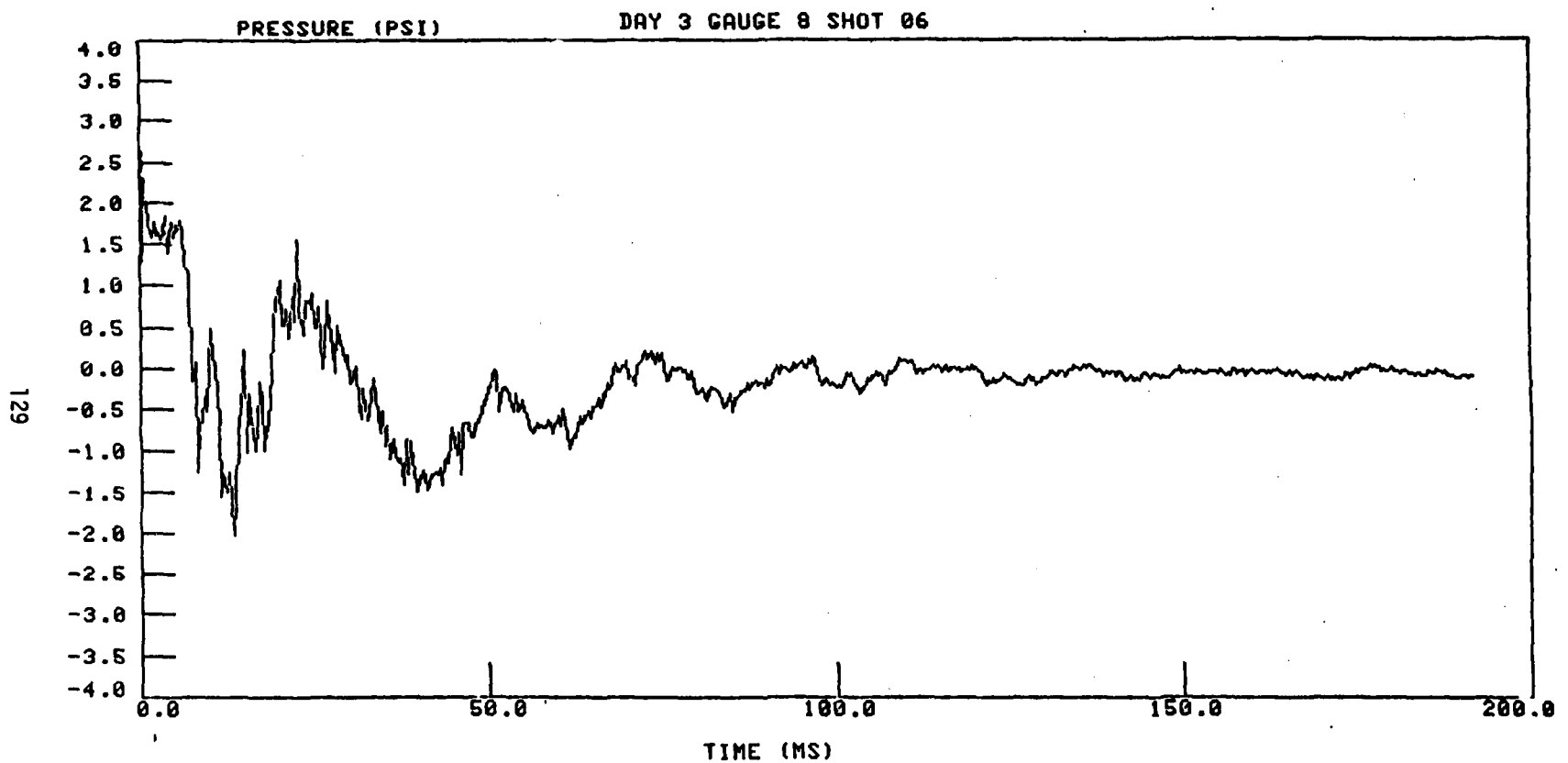

PRESSURE (PSI)
DAY 3 GAUGE 8 SHOT 06
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)
129

Figure 7-30

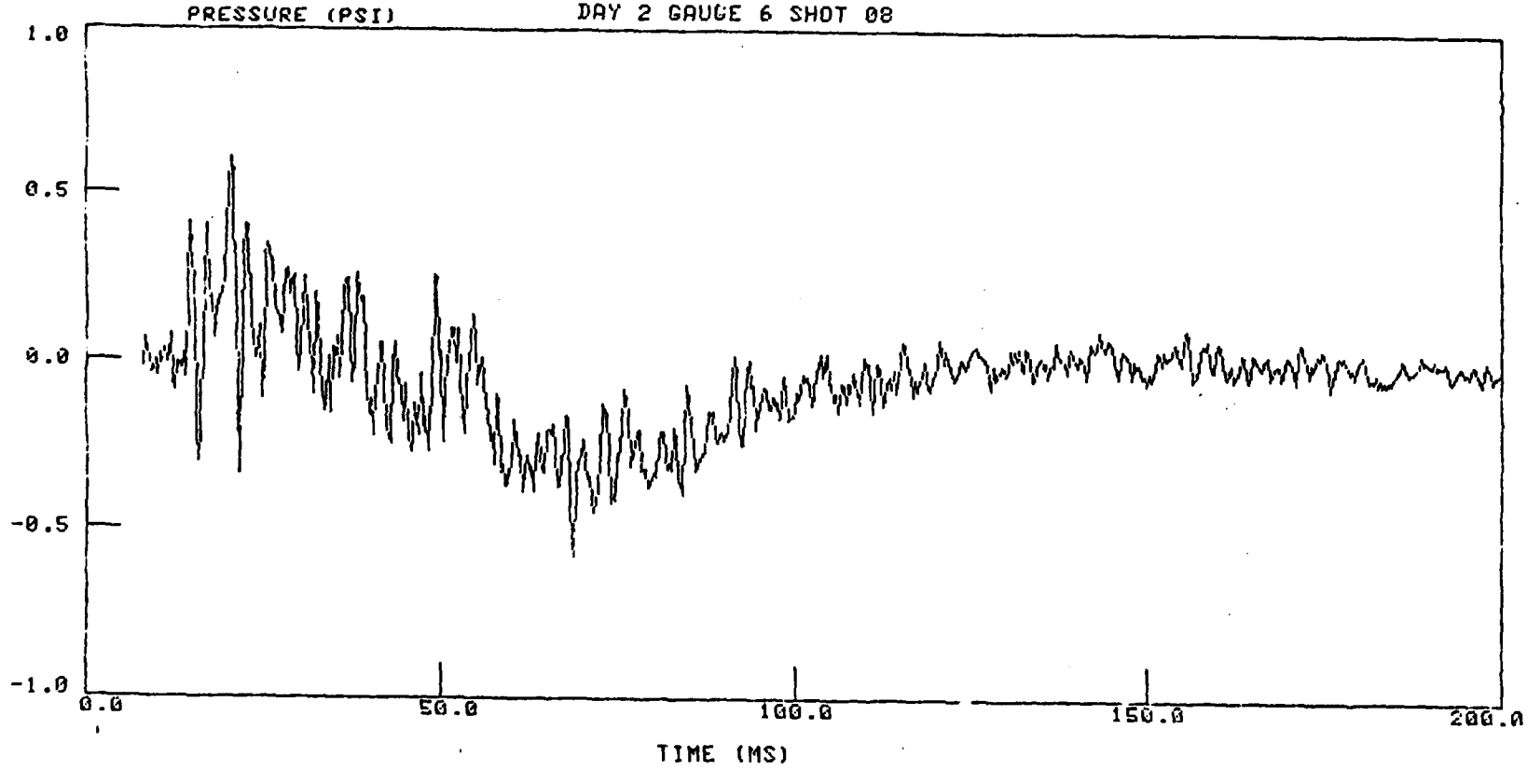

PRESSURE (PSI)
DAY 2 GAUGE 6 SHOT 08
1.0
0.5
0.0
-0.5
-1.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-31

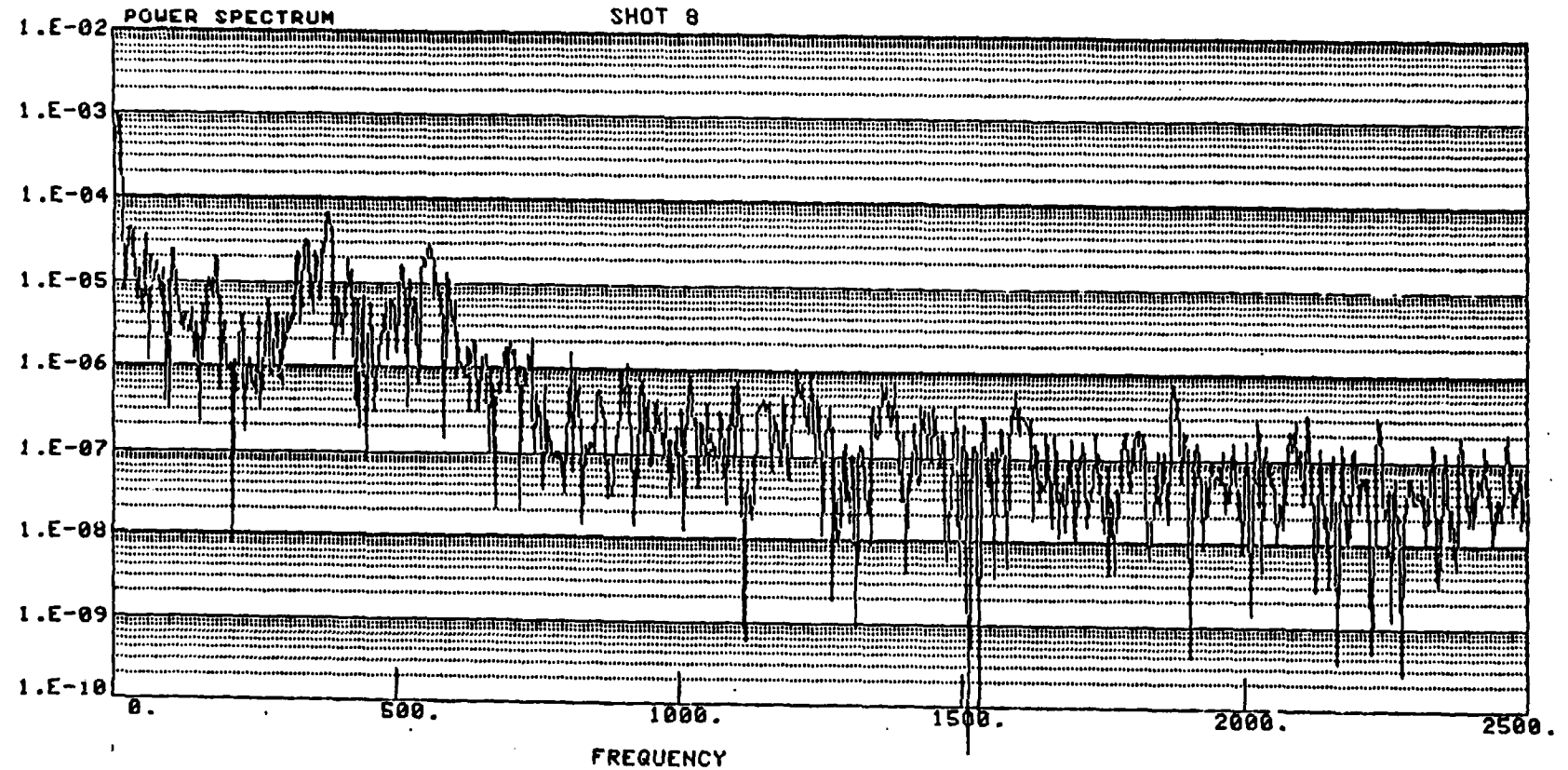

POWER SPECTRUM
SHOT 8
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
1.E-08
1.E-09
1.E-10
0.
500.
1000.
1500.
2000.
2500.
FREQUENCY

Figure 7-32

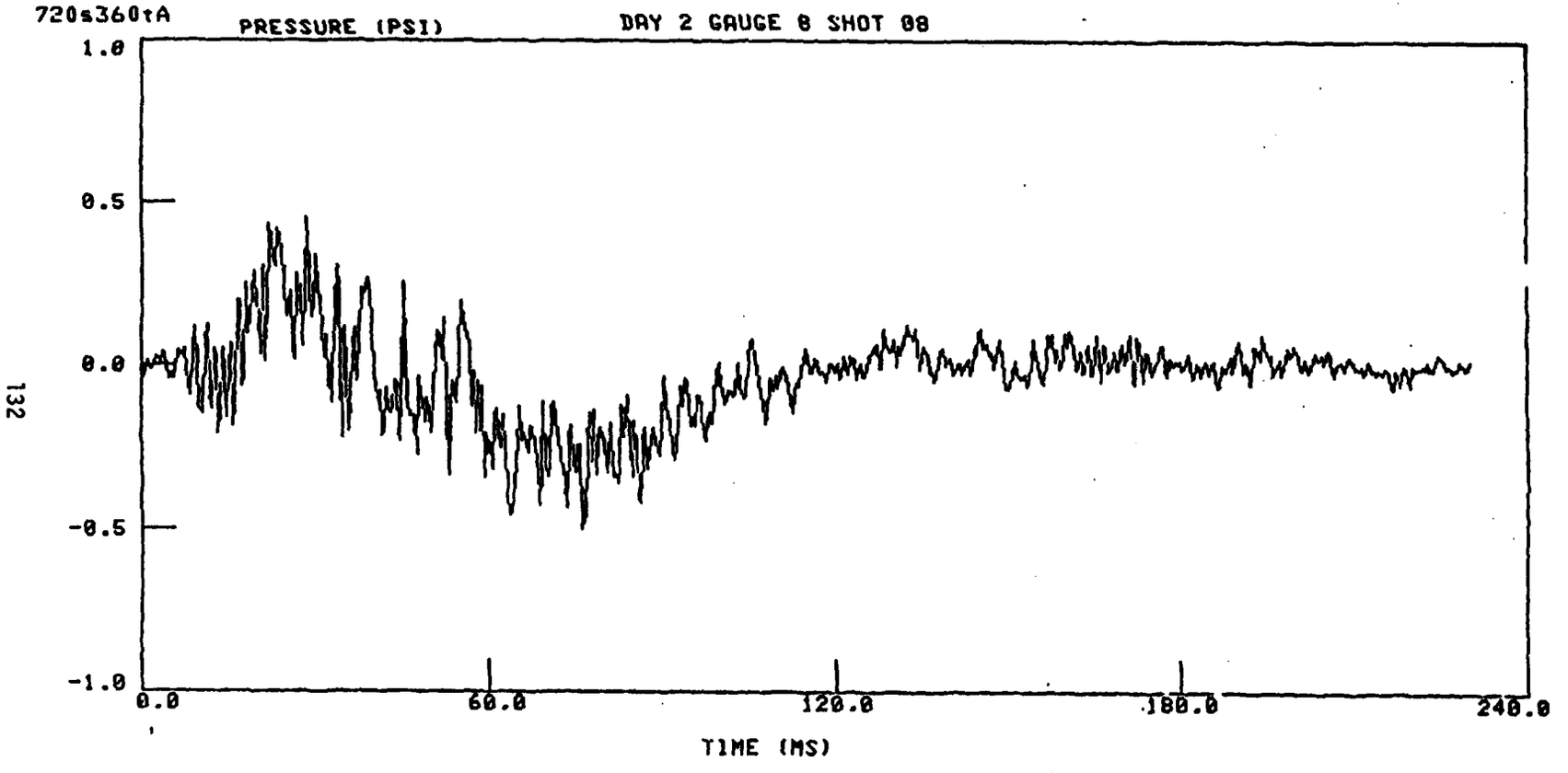

720s360tA
PRESSURE (PSI)
DAY 2 GAUGE 8 SHOT 08
1.0
0.5
0.0
-0.5
-1.0
132
0.0
60.0
120.0
180.0
240.0
TIME (MS)

Figure 7-33

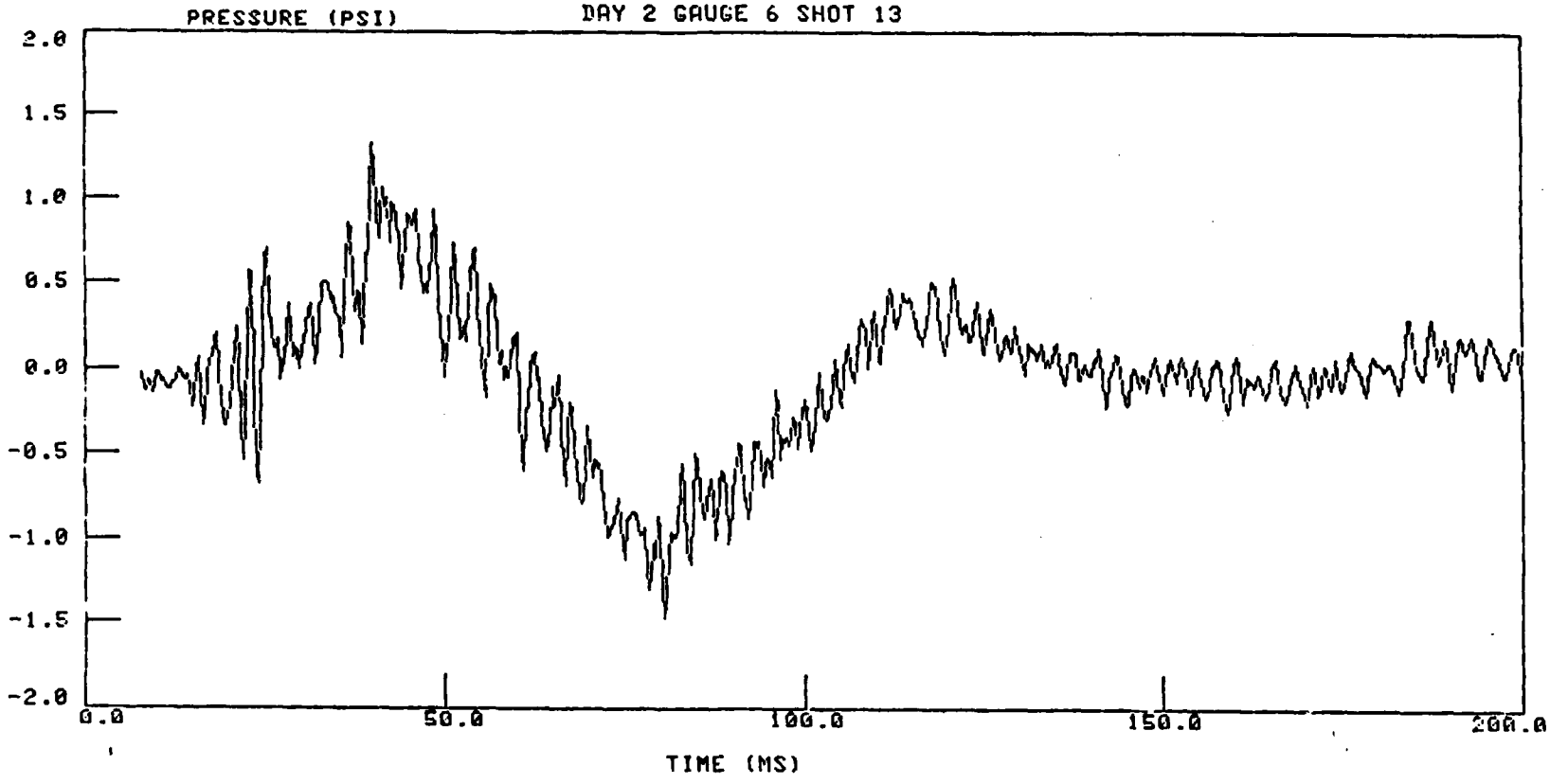

PRESSURE (PSI)
DAY 2 GAUGE 6 SHOT 13
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-34

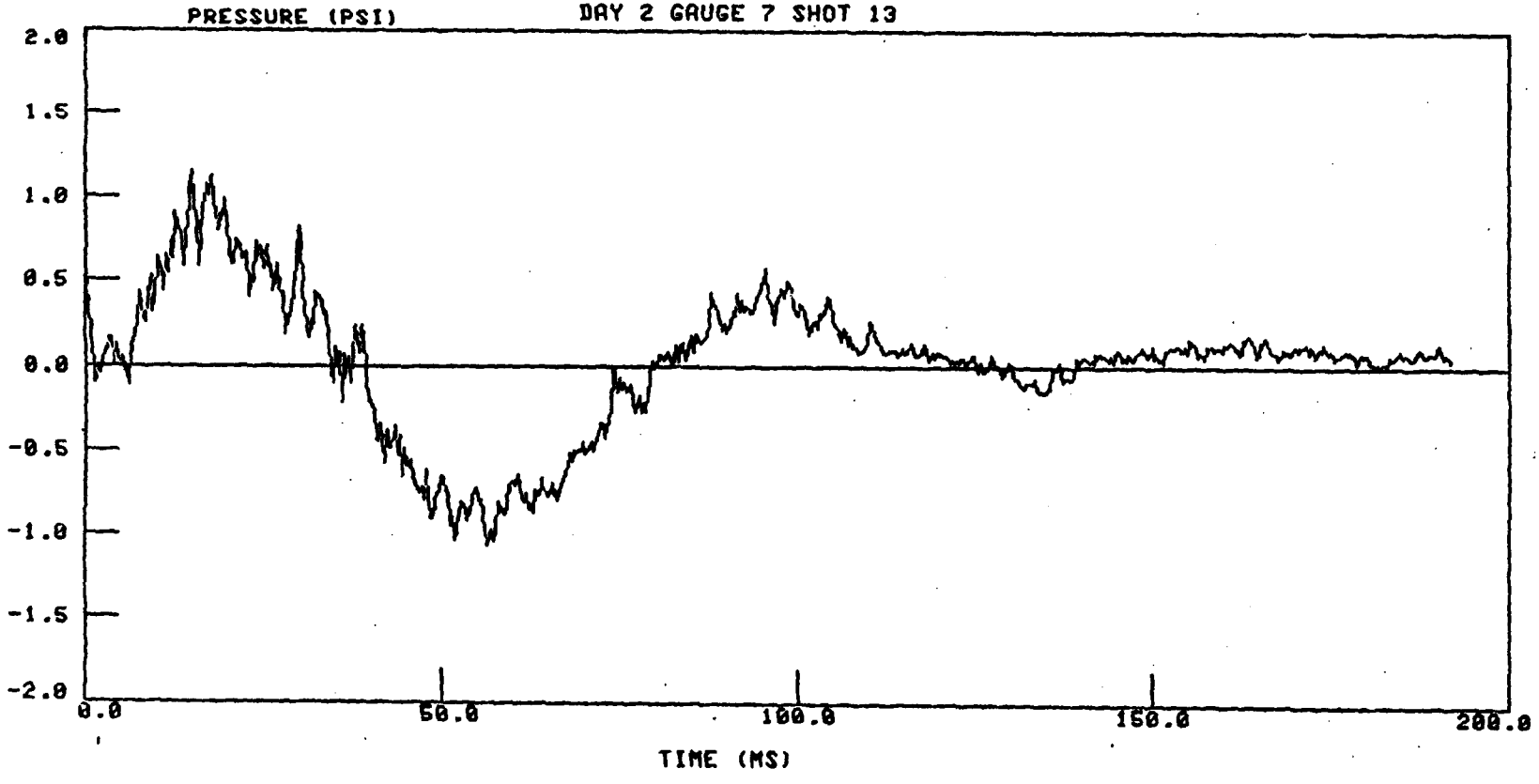

PRESSURE (PSI)
DAY 2 GAUGE 7 SHOT 13
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-35

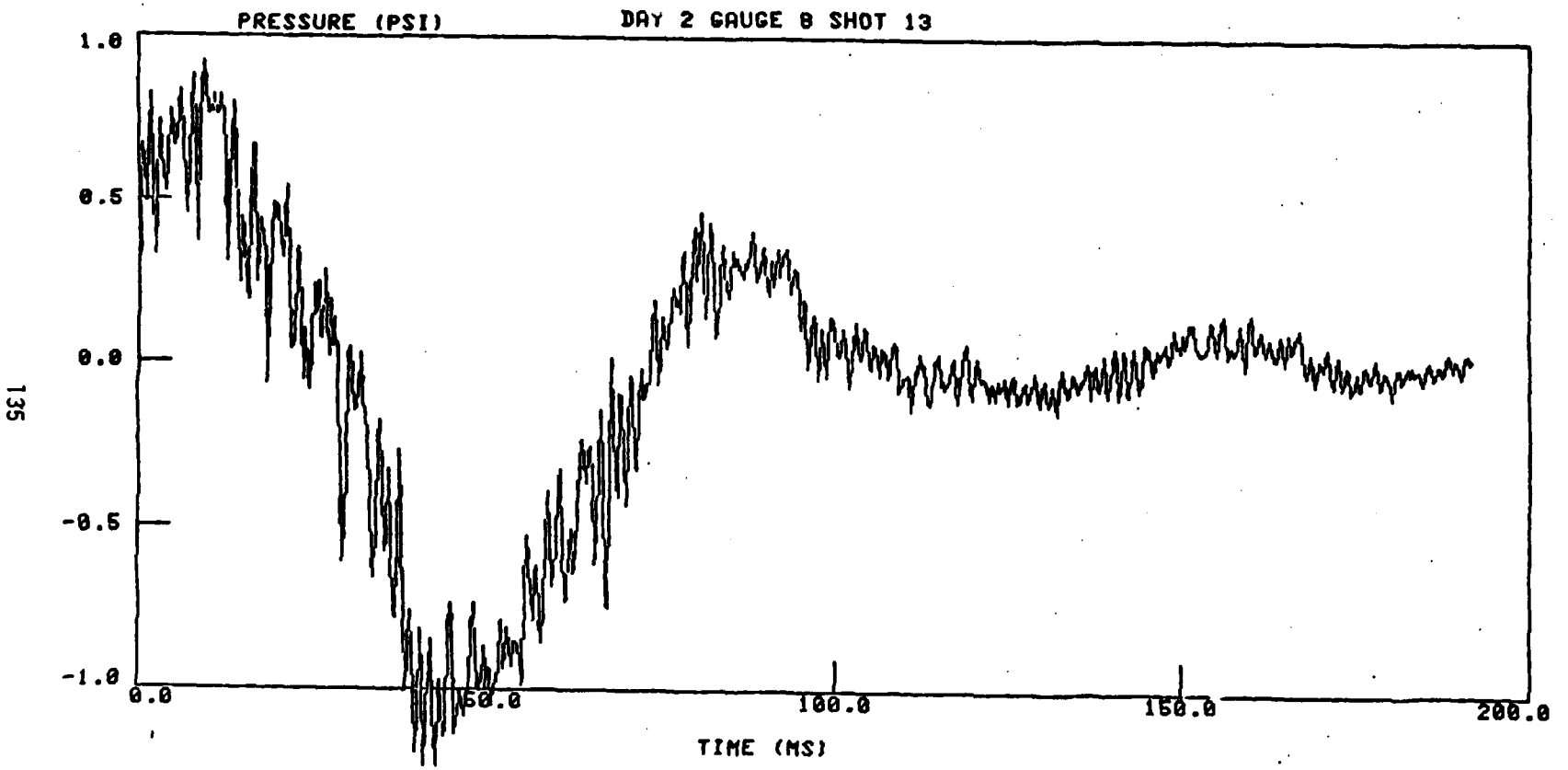

PRESSURE (PSI)
DAY 2 GAUGE 8 SHOT 13
1.0
0.5
0.0
-0.5
-1.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-36

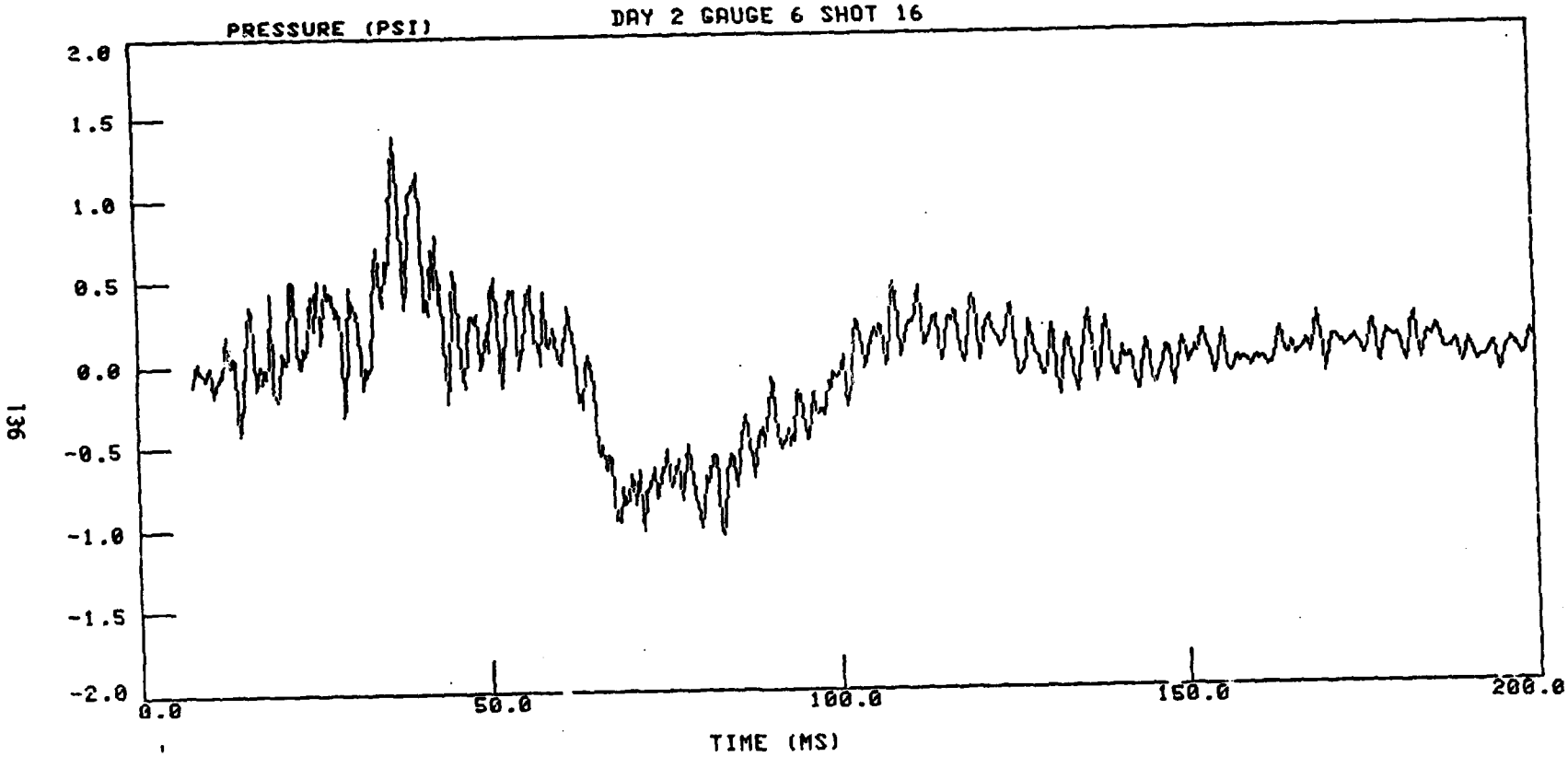

PRESSURE (PSI)
DAY 2 GAUGE 6 SHOT 16
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
136
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-37

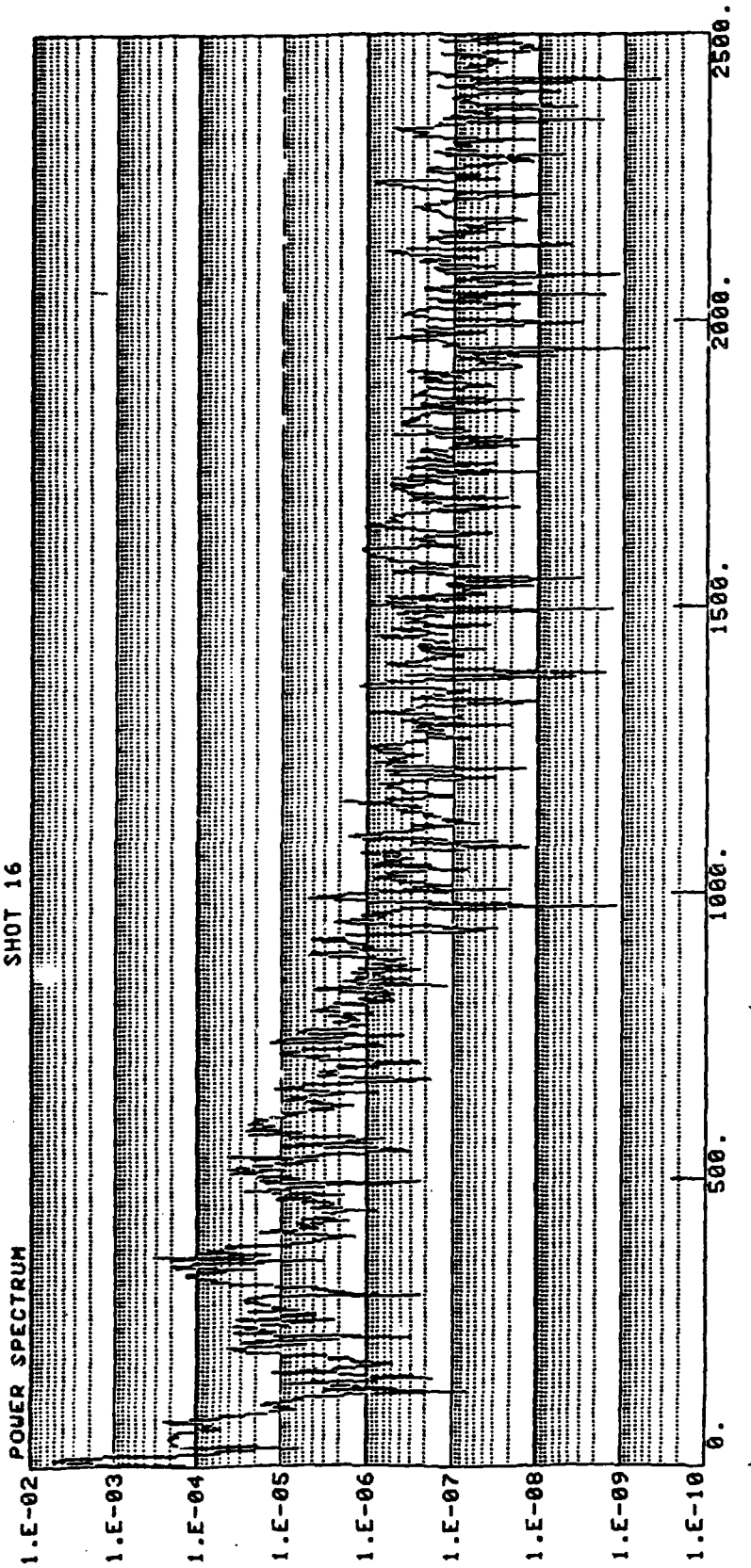

SHOT 16
POWER SPECTRUM
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
1.E-08
1.E-09
1.E-10
0.
500.
1000.
1500.
2000.
2500.
FREQUENCY

Figure 7-38

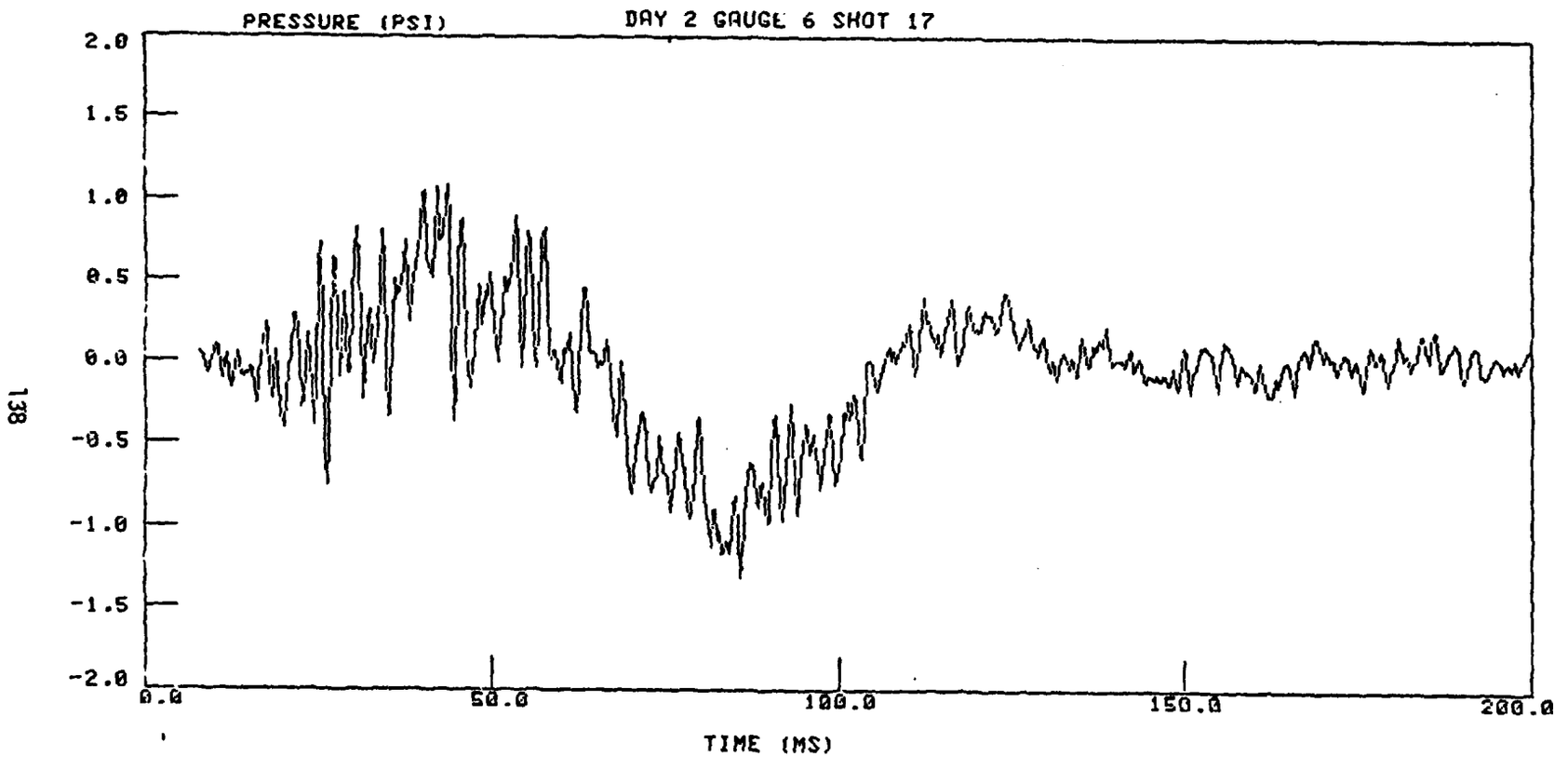

PRESSURE (PSI)
DAY 2 GAUGE 6 SHOT 17
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-39

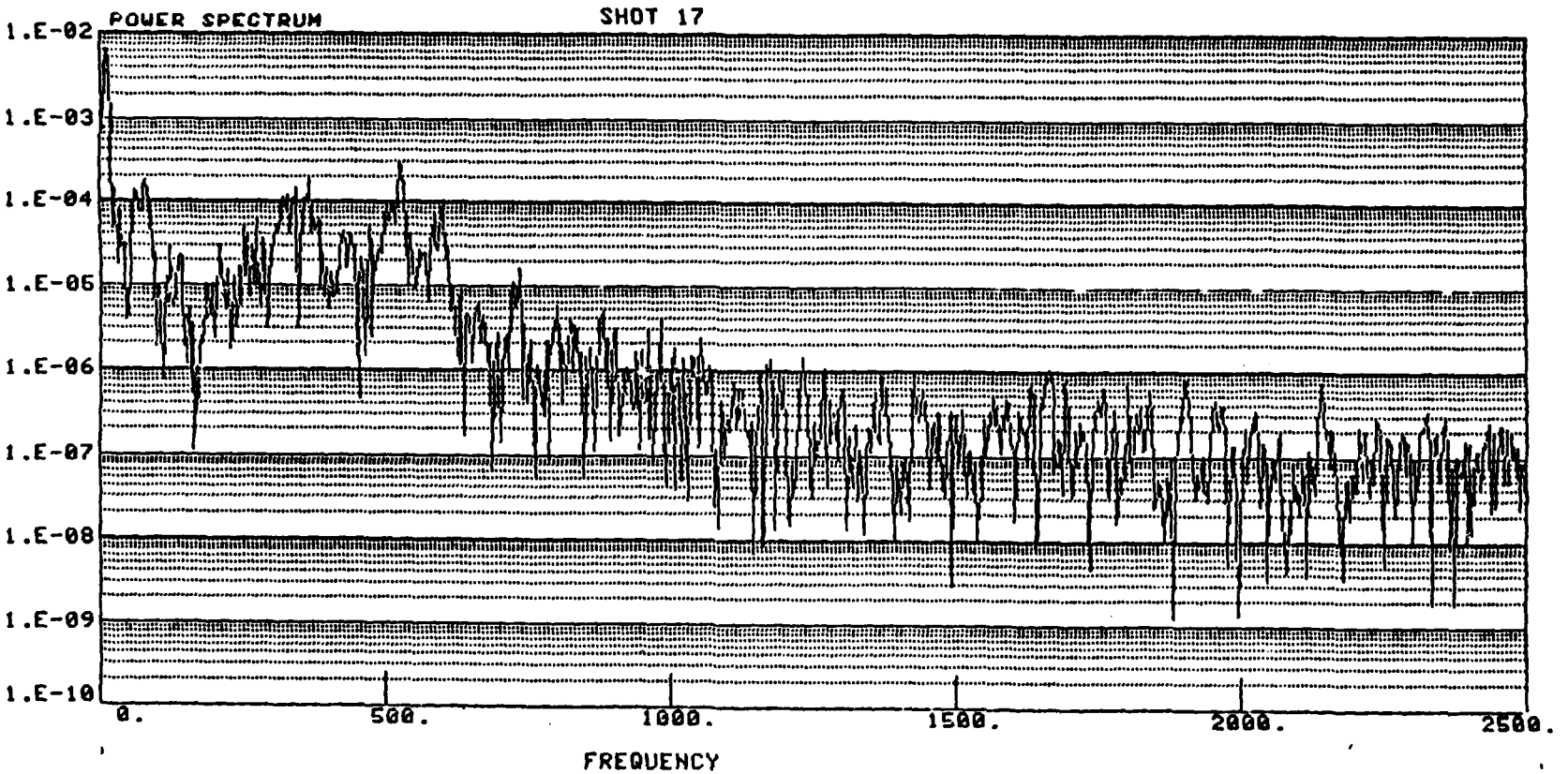

POWER SPECTRUM
SHOT 17
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
1.E-08
1.E-09
1.E-10
0.
500.
1000.
1500.
2000.
2500.
FREQUENCY

Figure 7-40

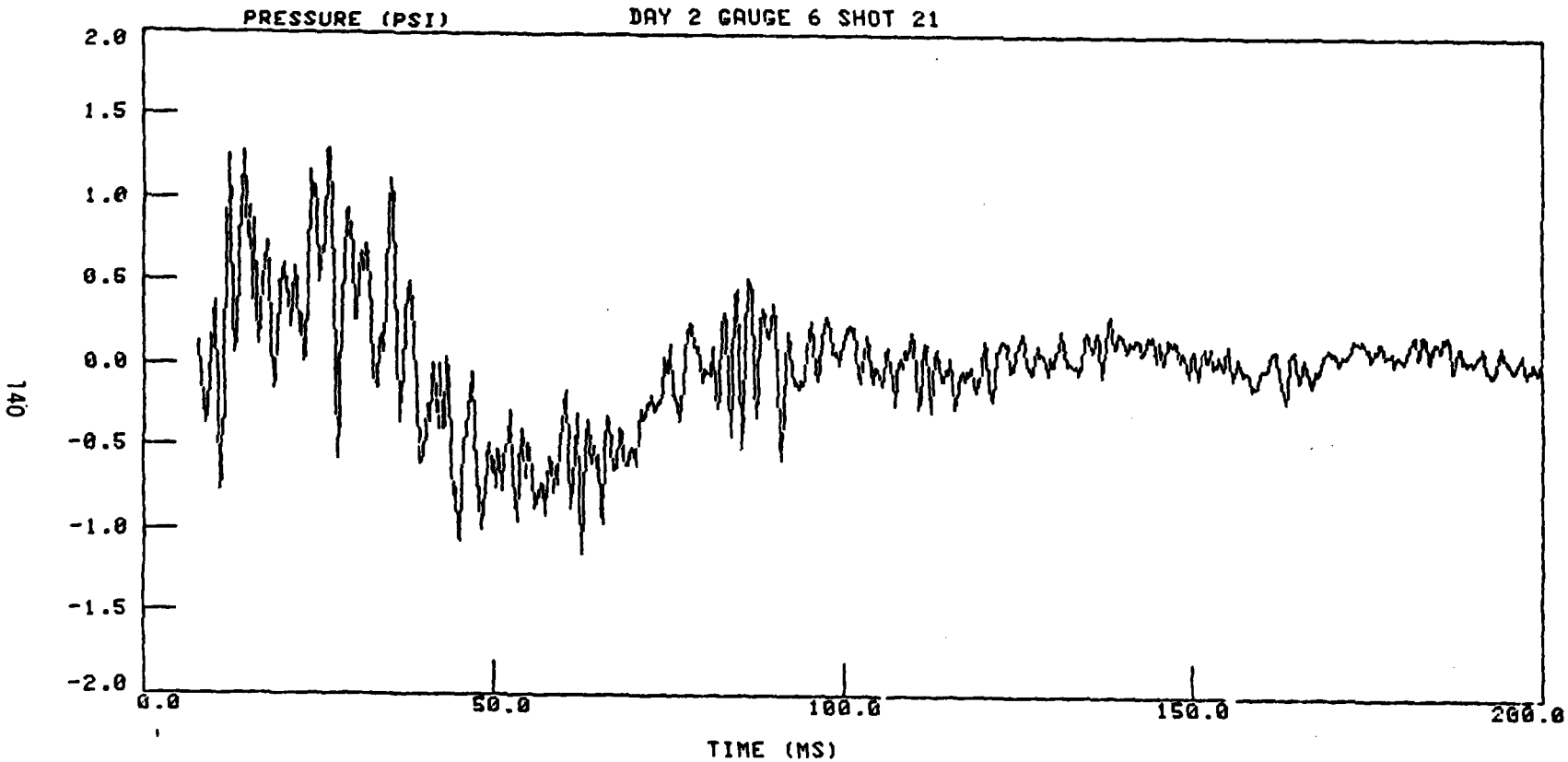

PRESSURE (PSI)
DAY 2 GAUGE 6 SHOT 21
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-41

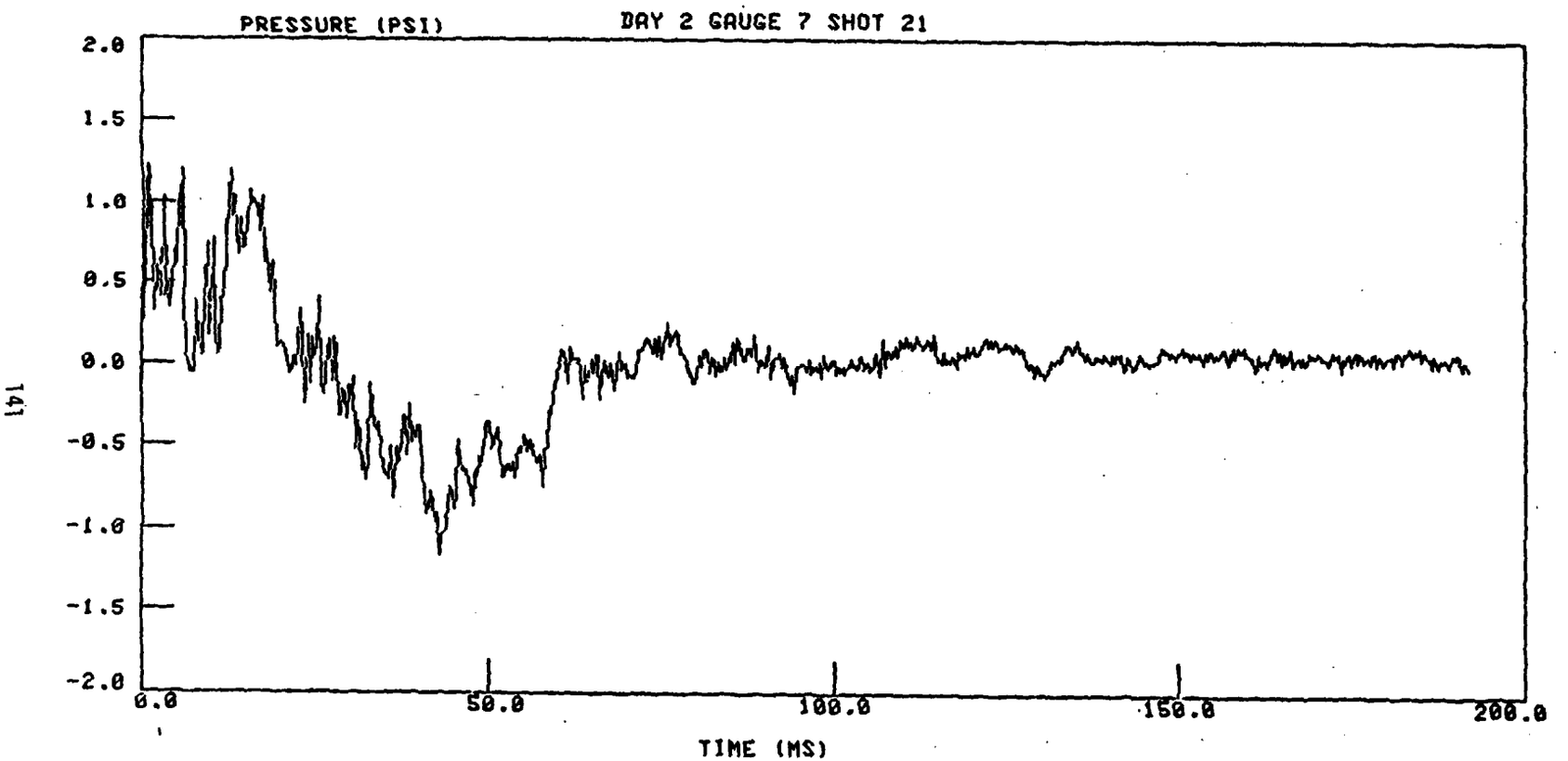

PRESSURE (PSI)
DAY 2 GAUGE 7 SHOT 21
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-42

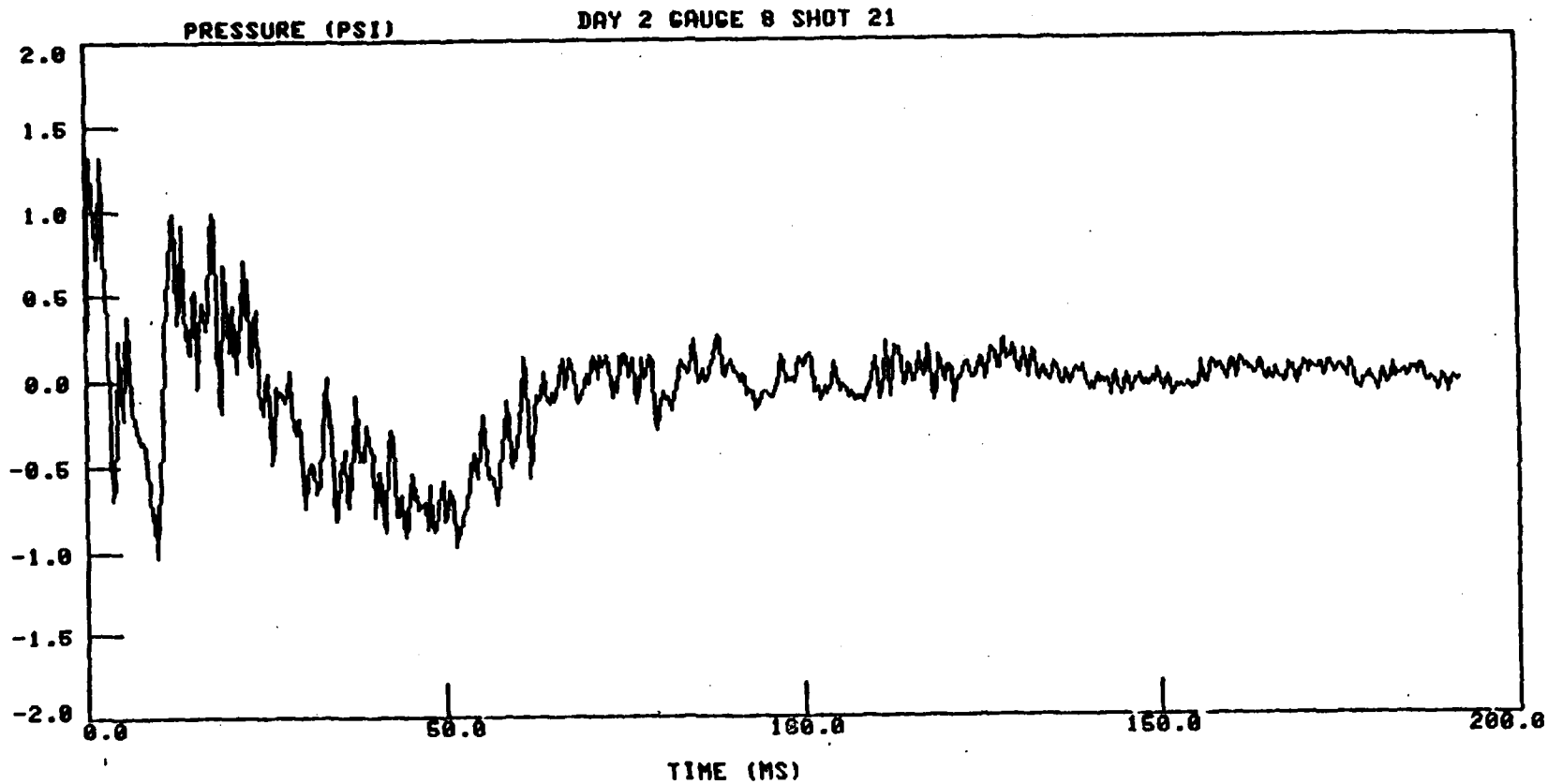

PRESSURE (PSI)
DAY 2 GAUGE 8 SHOT 21
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-43

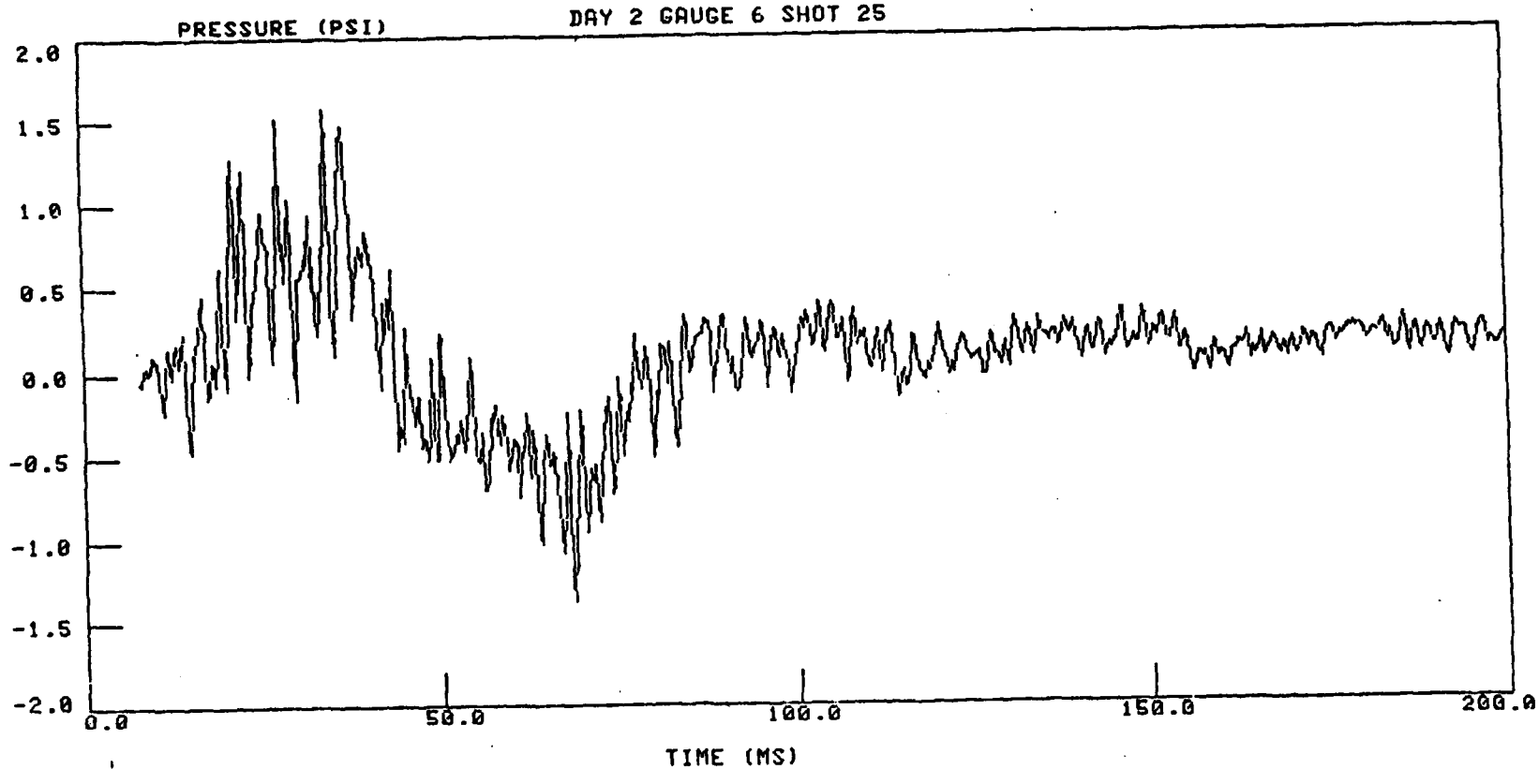

PRESSURE (PSI)
DAY 2 GAUGE 6 SHOT 25
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-44

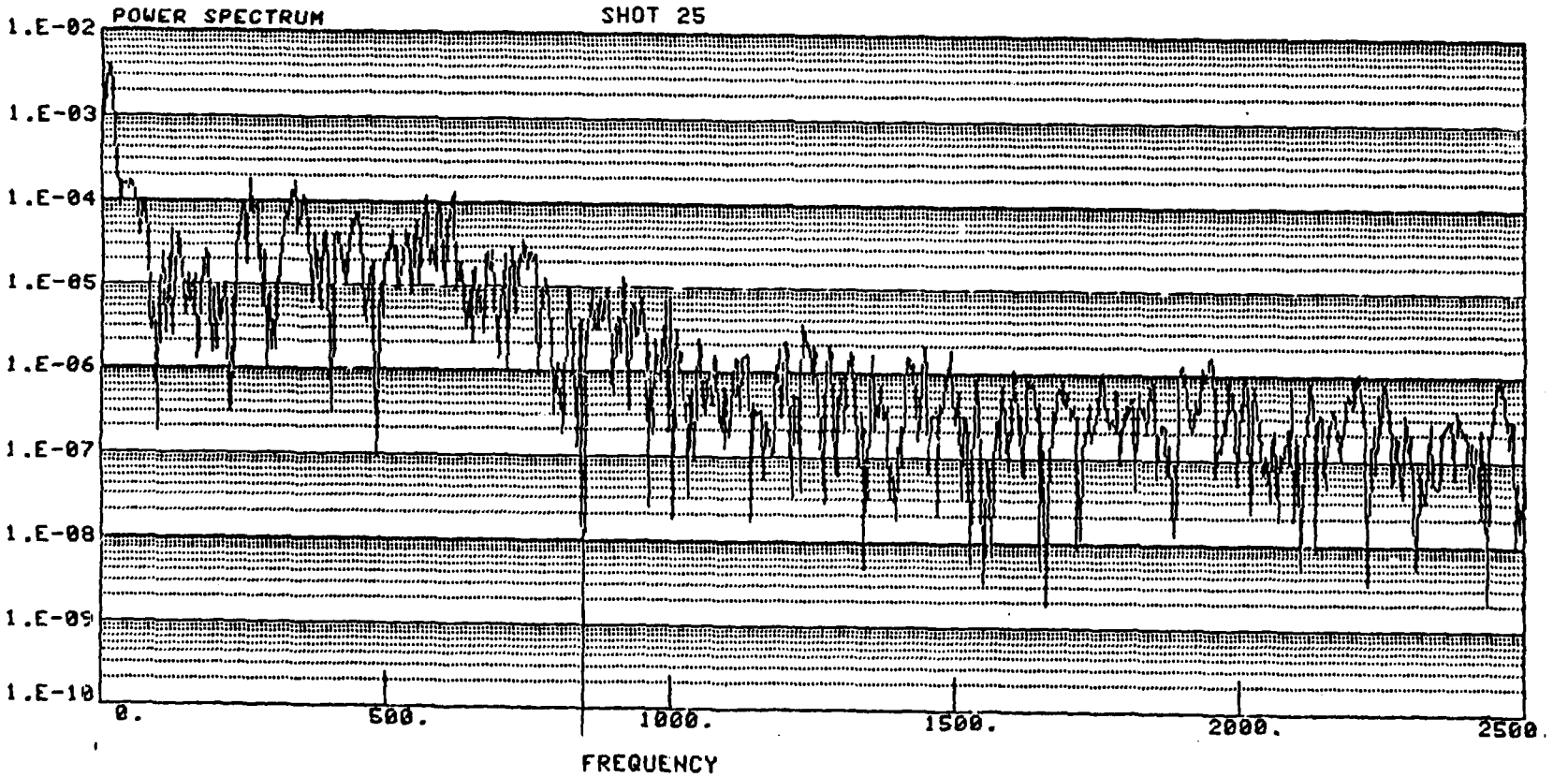

POWER SPECTRUM
SHOT 25
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
1.E-08
1.E-09
1.E-10
0.
500.
1000.
1500.
2000.
2500.
FREQUENCY

Figure 7-45

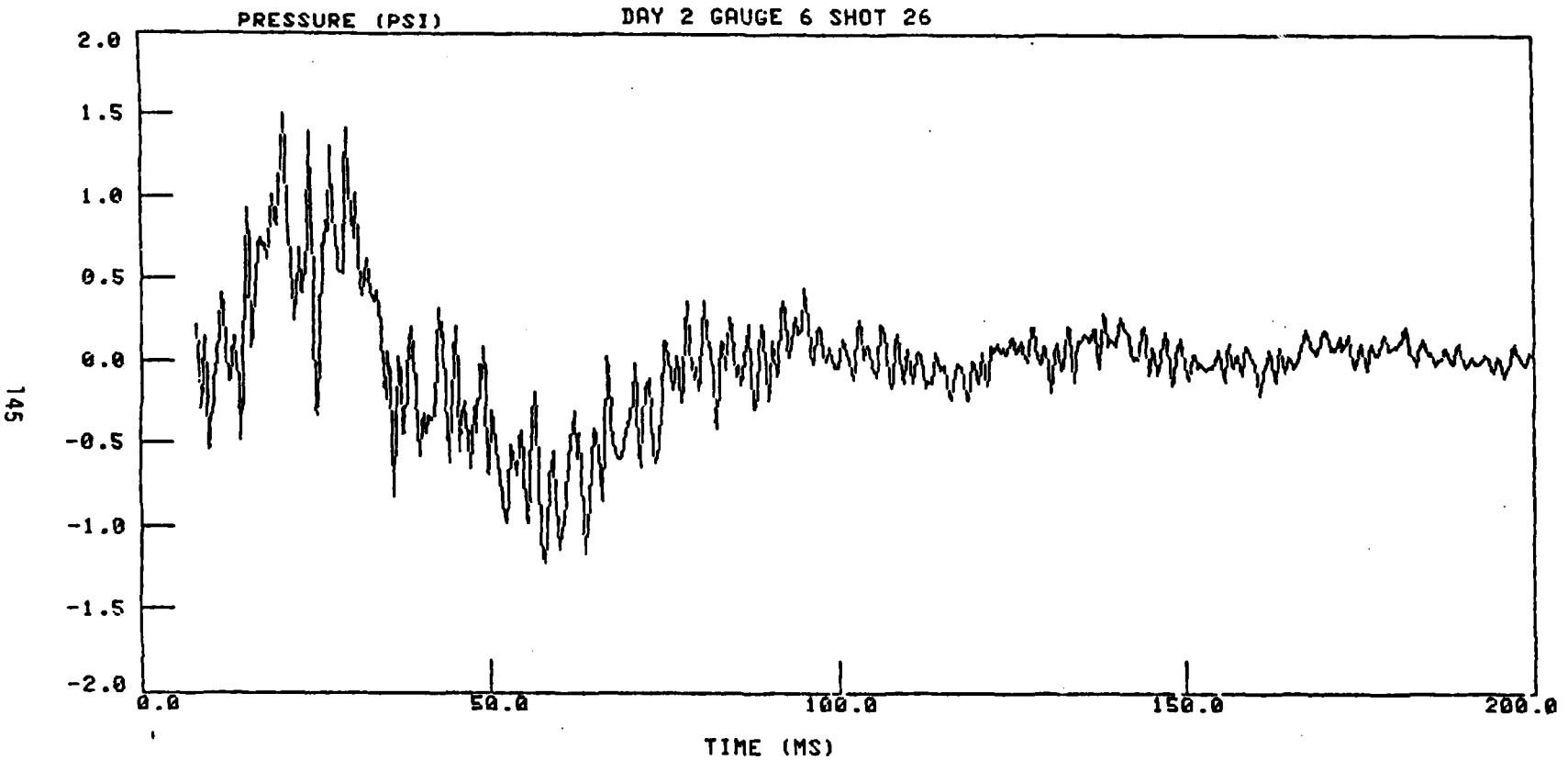

PRESSURE (PSI)
DAY 2 GAUGE 6 SHOT 26
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
145
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-46

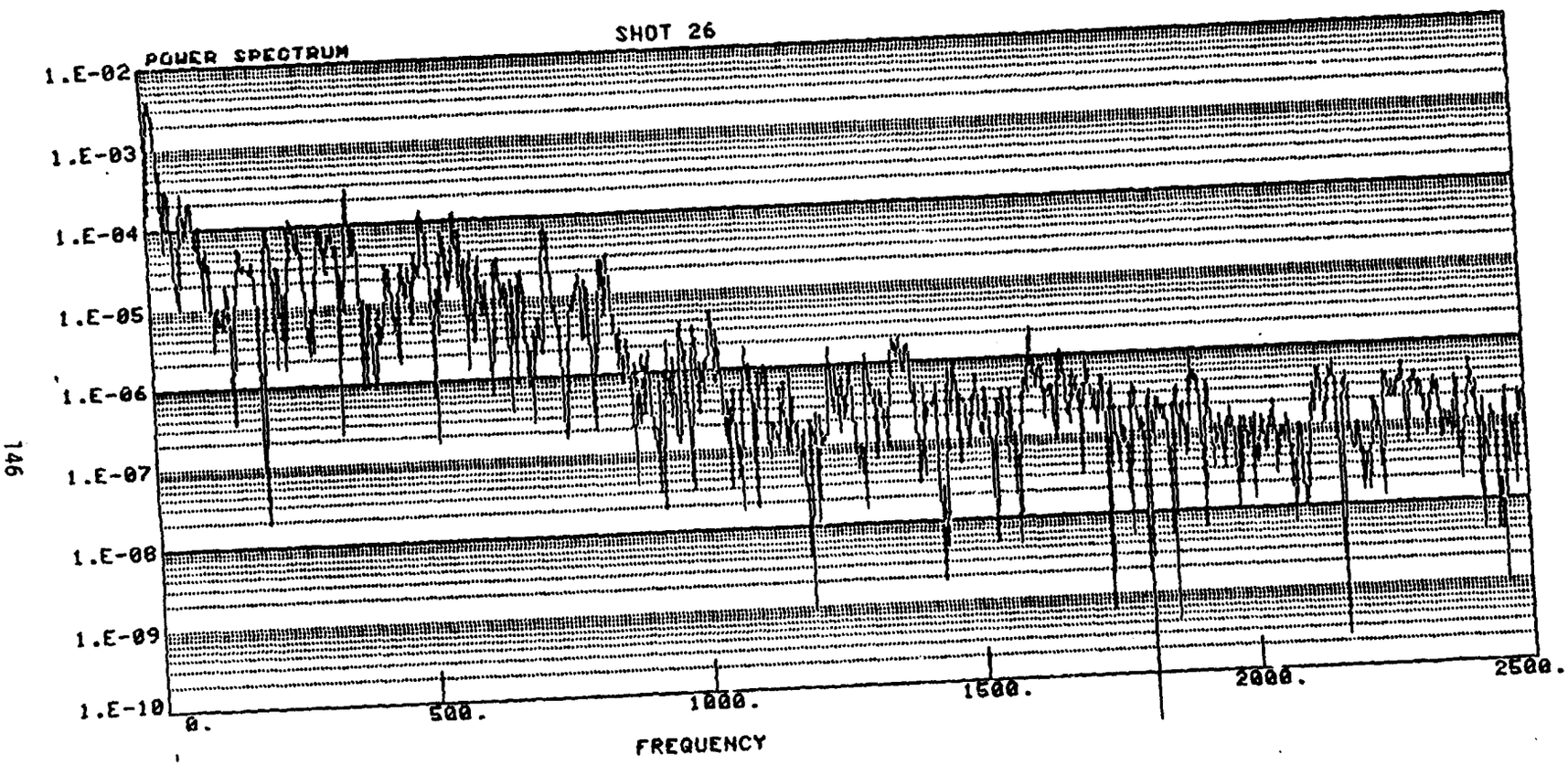

SHOT 26
POWER SPECTRUM
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
1.E-08
1.E-09
1.E-10
0.
500.
1000.
1500.
2000.
2500.
FREQUENCY

Figure 7-47

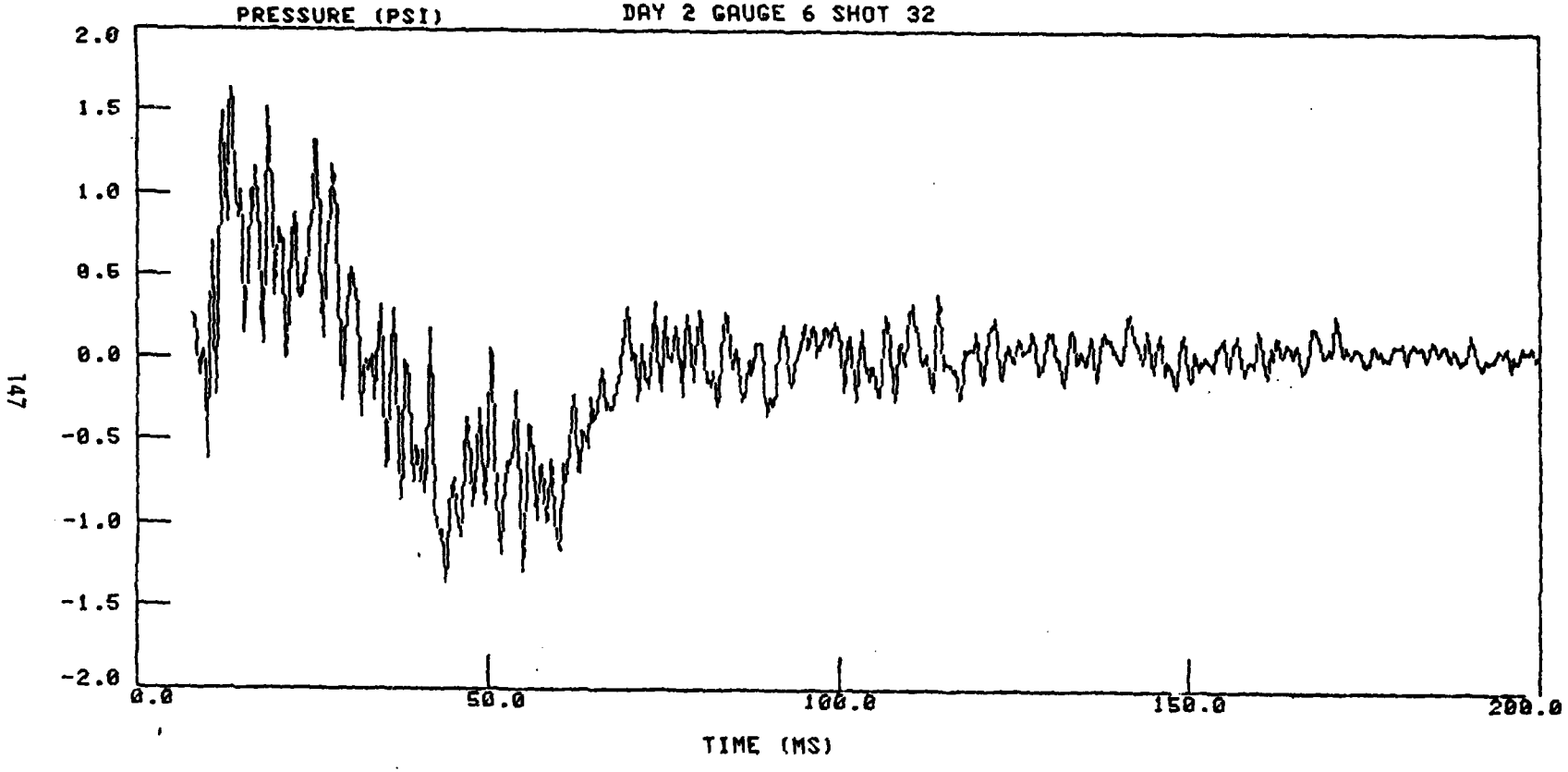

PRESSURE (PSI)
DAY 2 GAUGE 6 SHOT 32
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-48

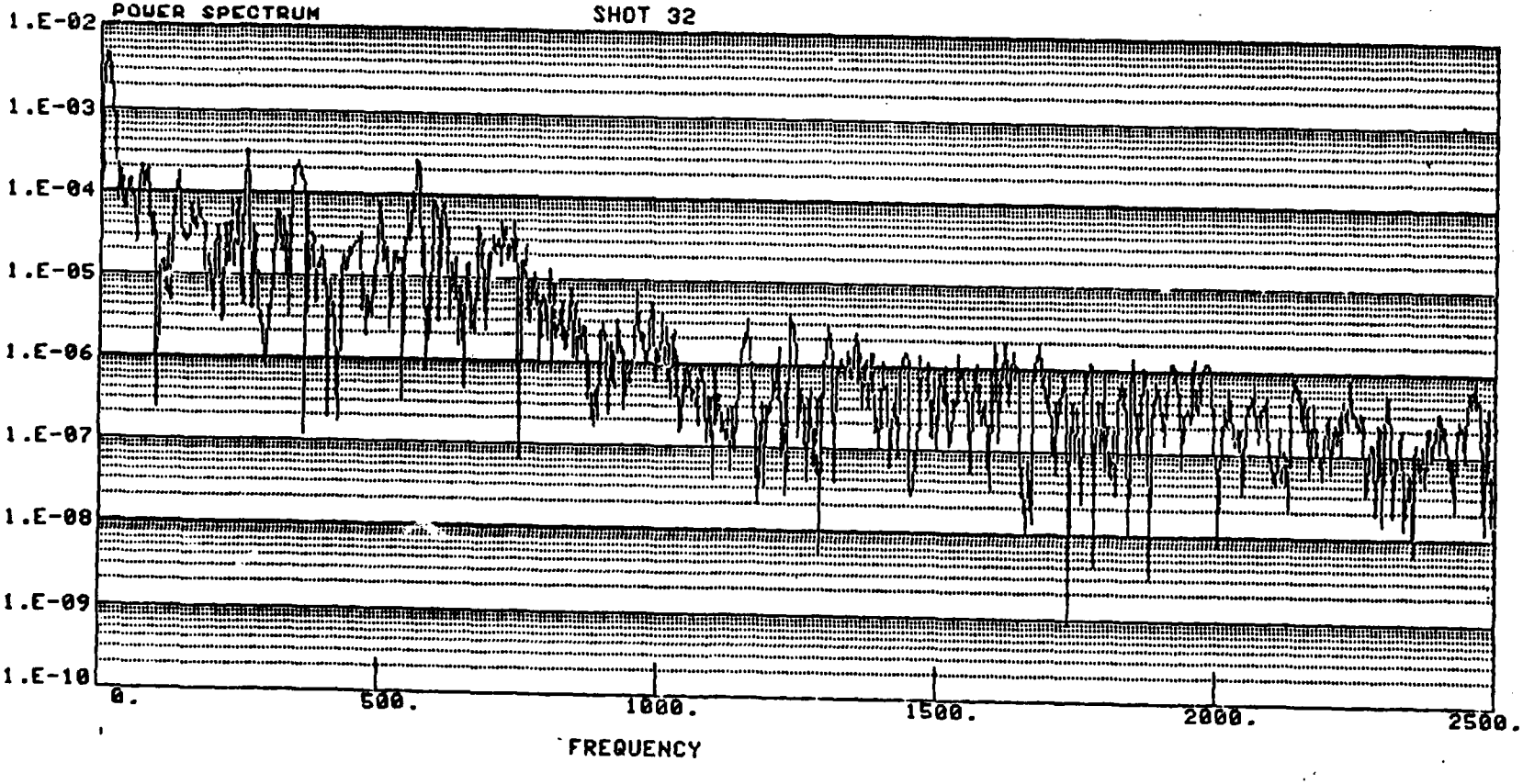

POWER SPECTRUM
SHOT 32
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
1.E-08
1.E-09
1.E-10
0.
500.
1000.
1500.
2000.
2500.
FREQUENCY

Figure 7-49

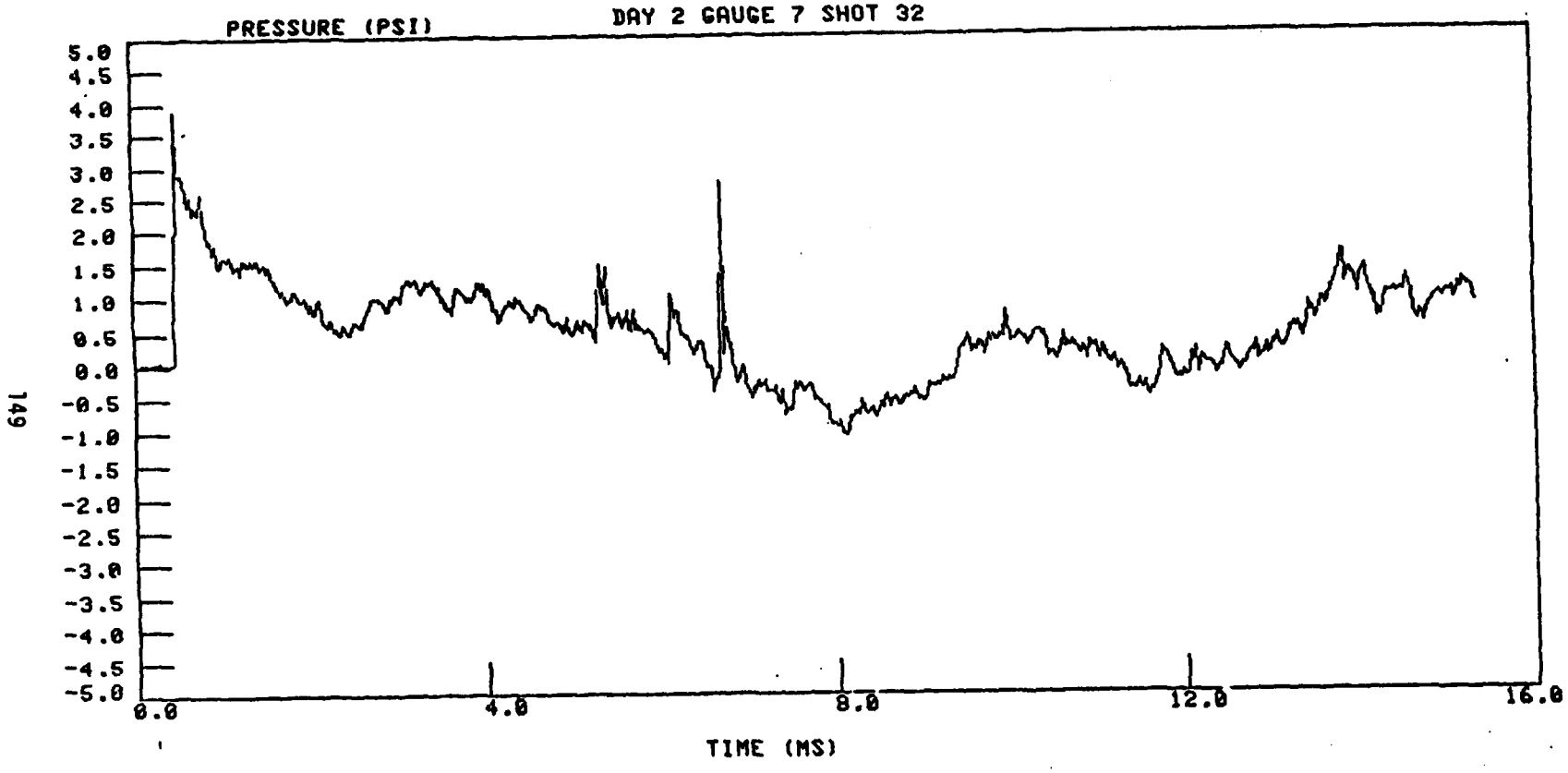

PRESSURE (PSI)
DAY 2 GAUGE 7 SHOT 32
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
-4.5
-5.0
0.0
4.0
8.0
12.0
16.0
TIME (MS)

Figure 7-50

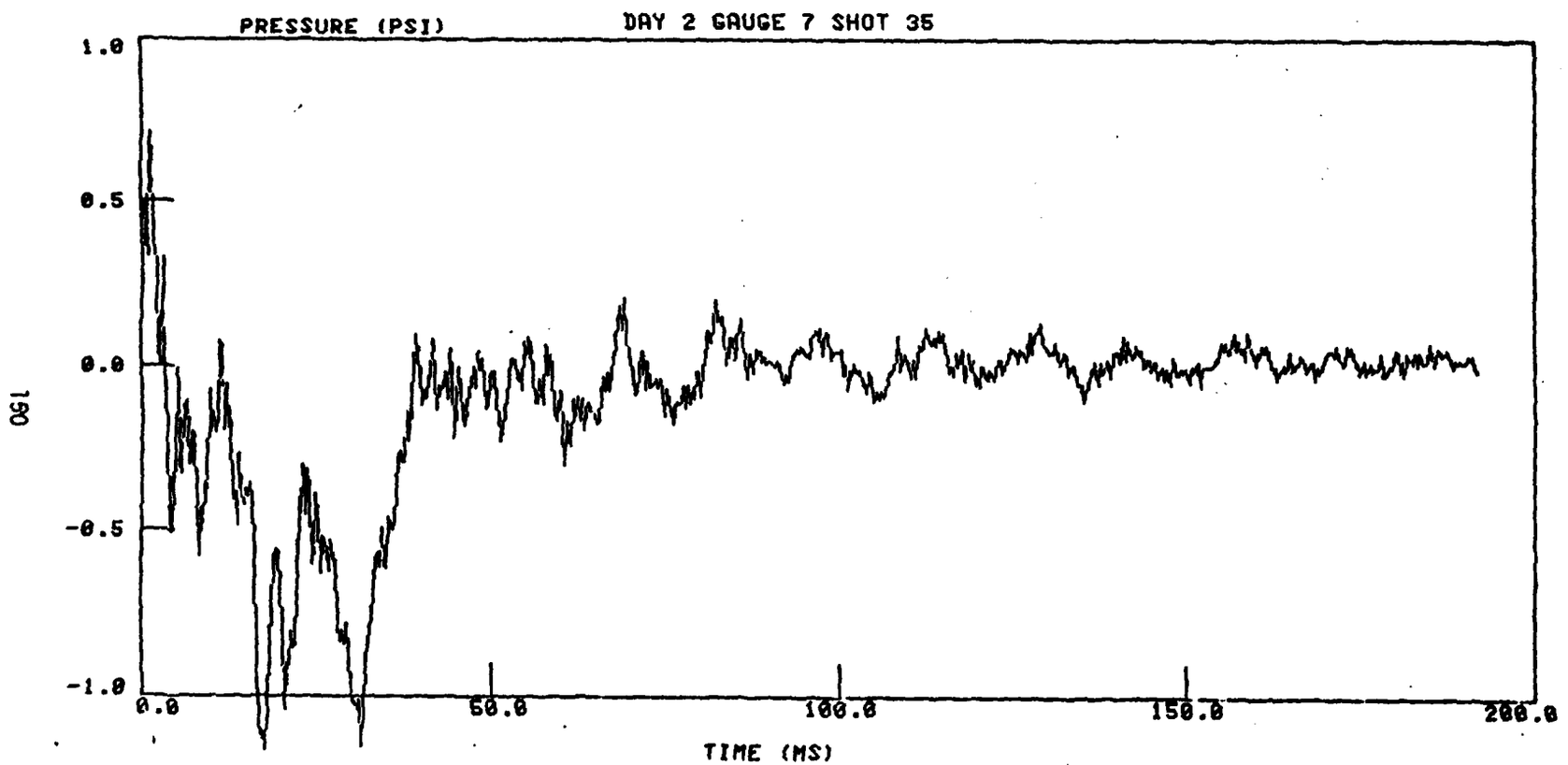

PRESSURE (PSI)
DAY 2 GAUGE 7 SHOT 35
1.0
0.5
0.0
-0.5
-1.0
190
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-51

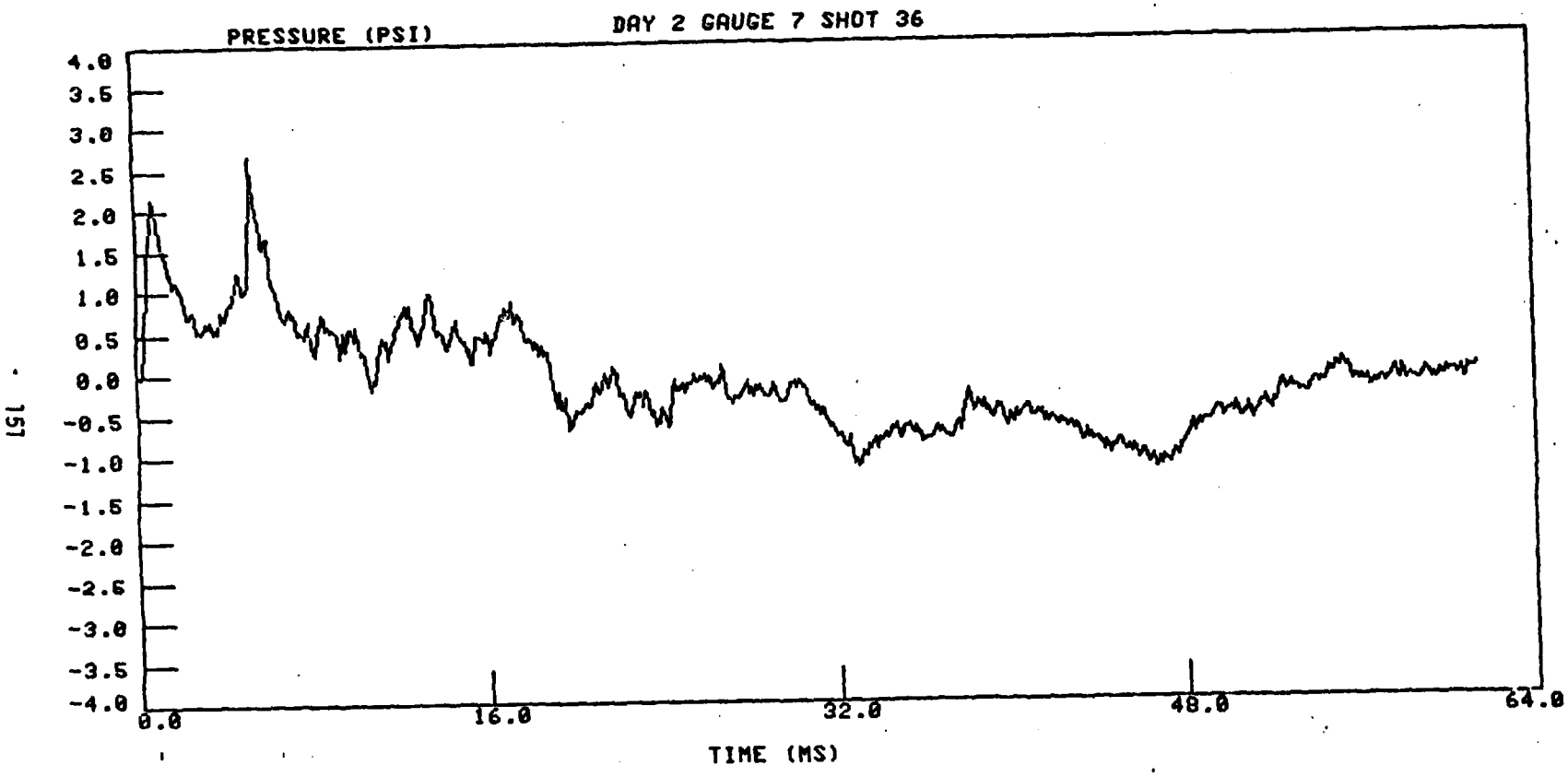

PRESSURE (PSI)
DAY 2 GAUGE 7 SHOT 36
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
0.0
16.0
32.0
48.0
64.0
TIME (MS)

Figure 7-52

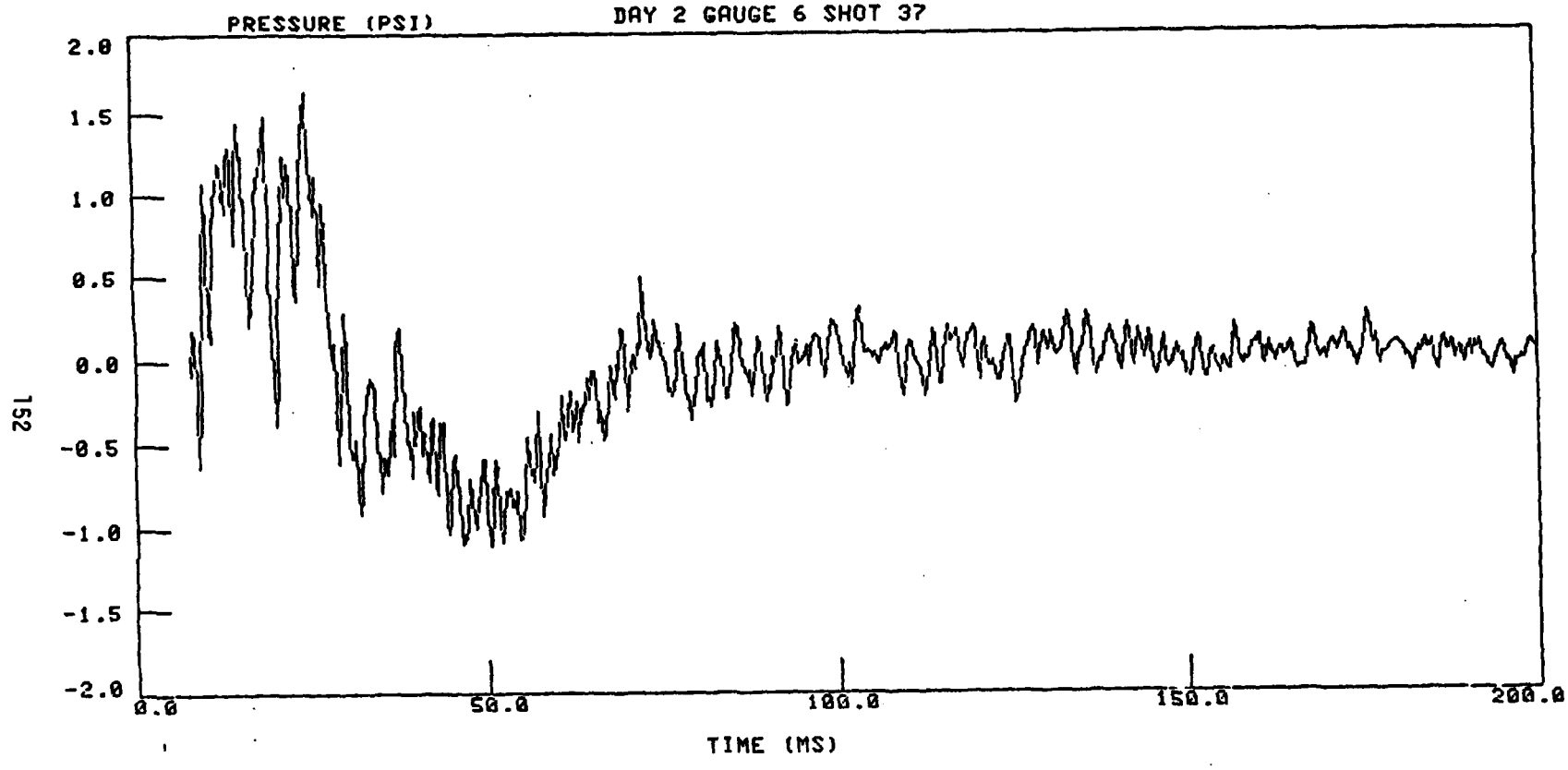

PRESSURE (PSI)
DAY 2 GAUGE 6 SHOT 37
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
152
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-53

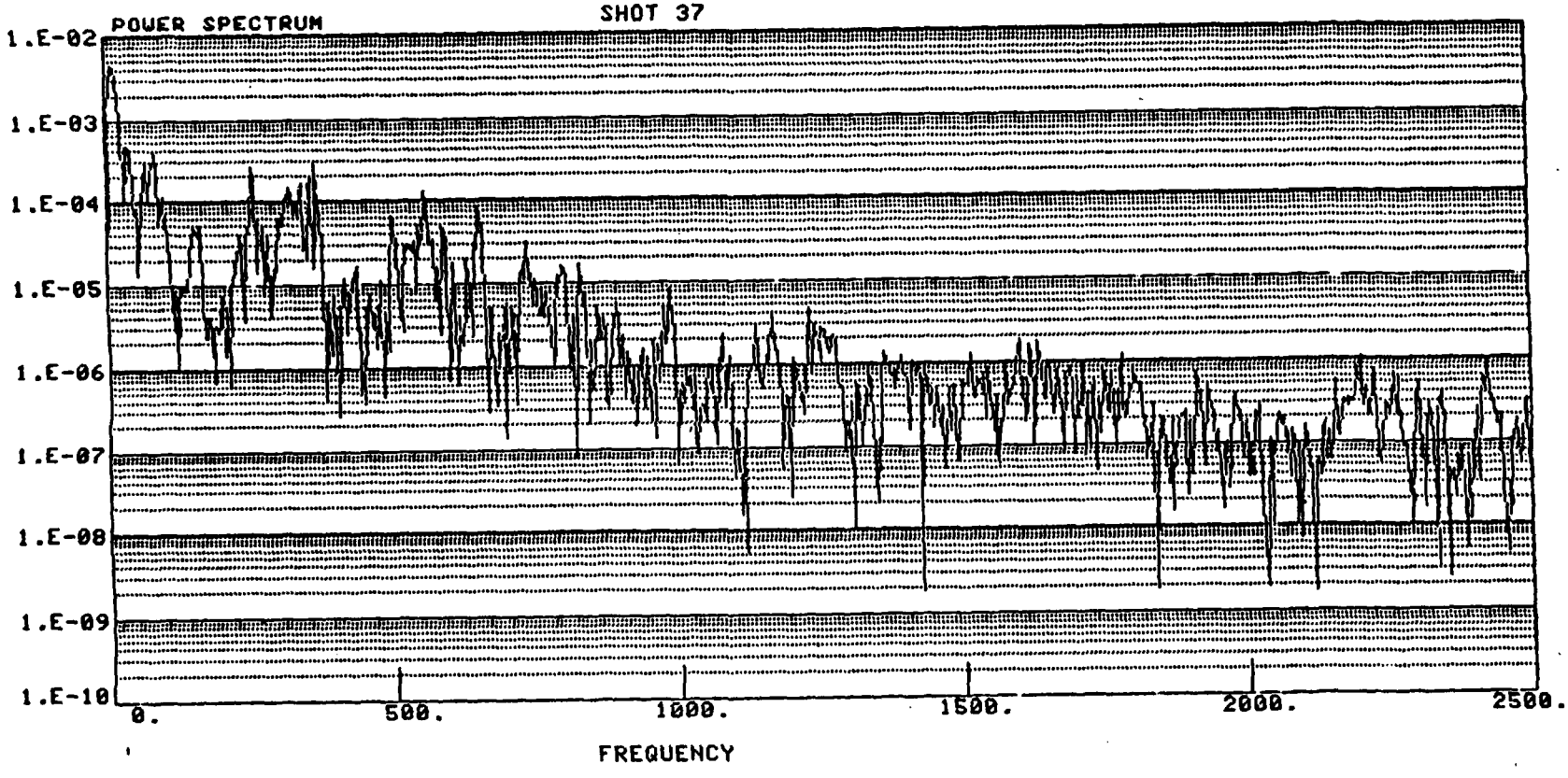

POWER SPECTRUM
SHOT 37
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
1.E-08
1.E-09
1.E-10
0.
500.
1000.
1500.
2000.
2500.
FREQUENCY

Figure 7-54

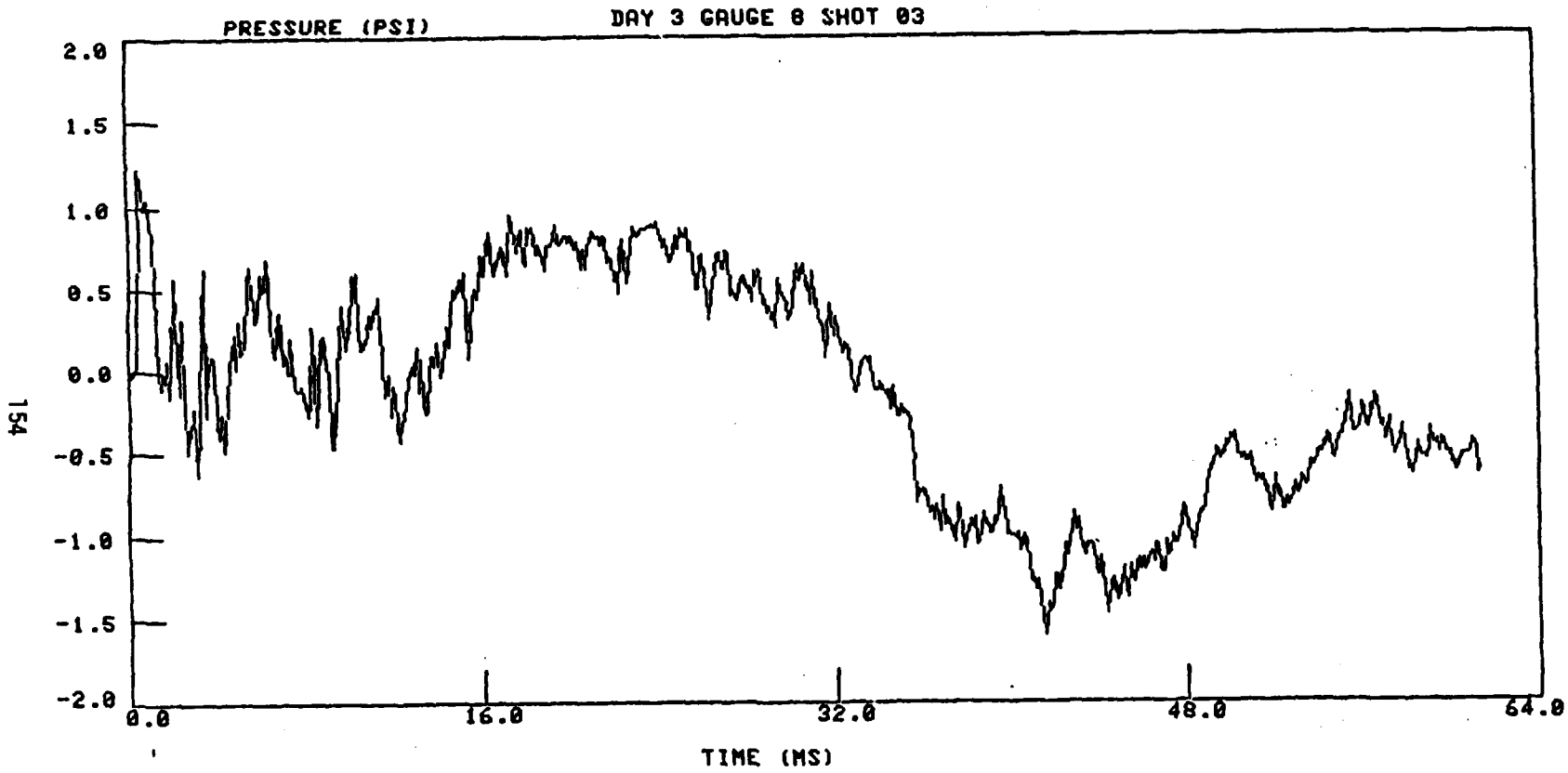

PRESSURE (PSI)
DAY 3 GAUGE 8 SHOT 03
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
16.0
32.0
48.0
64.0
TIME (MS)

Figure 7-55

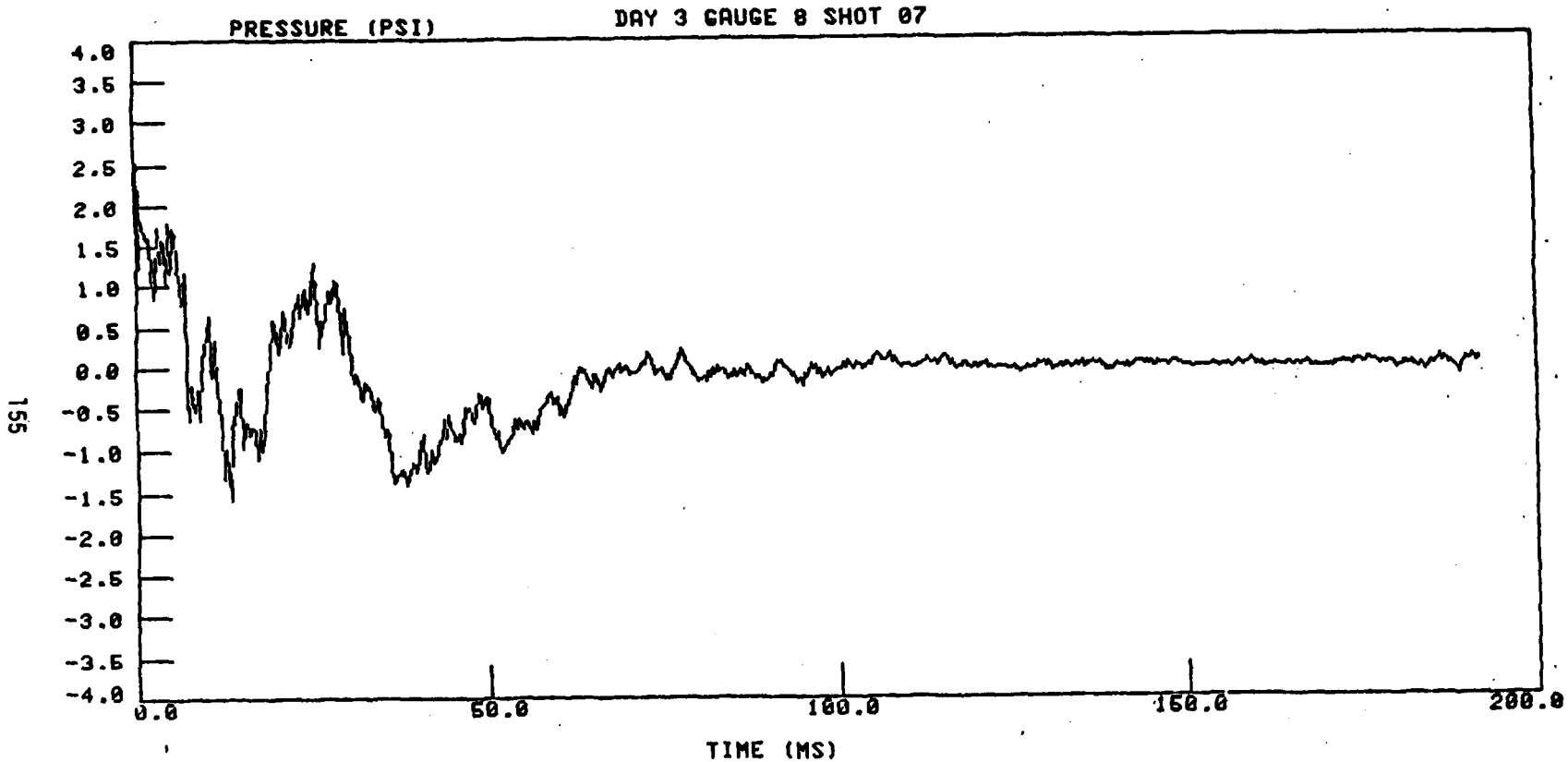

PRESSURE (PSI)
DAY 3 GAUGE 8 SHOT 07
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-56

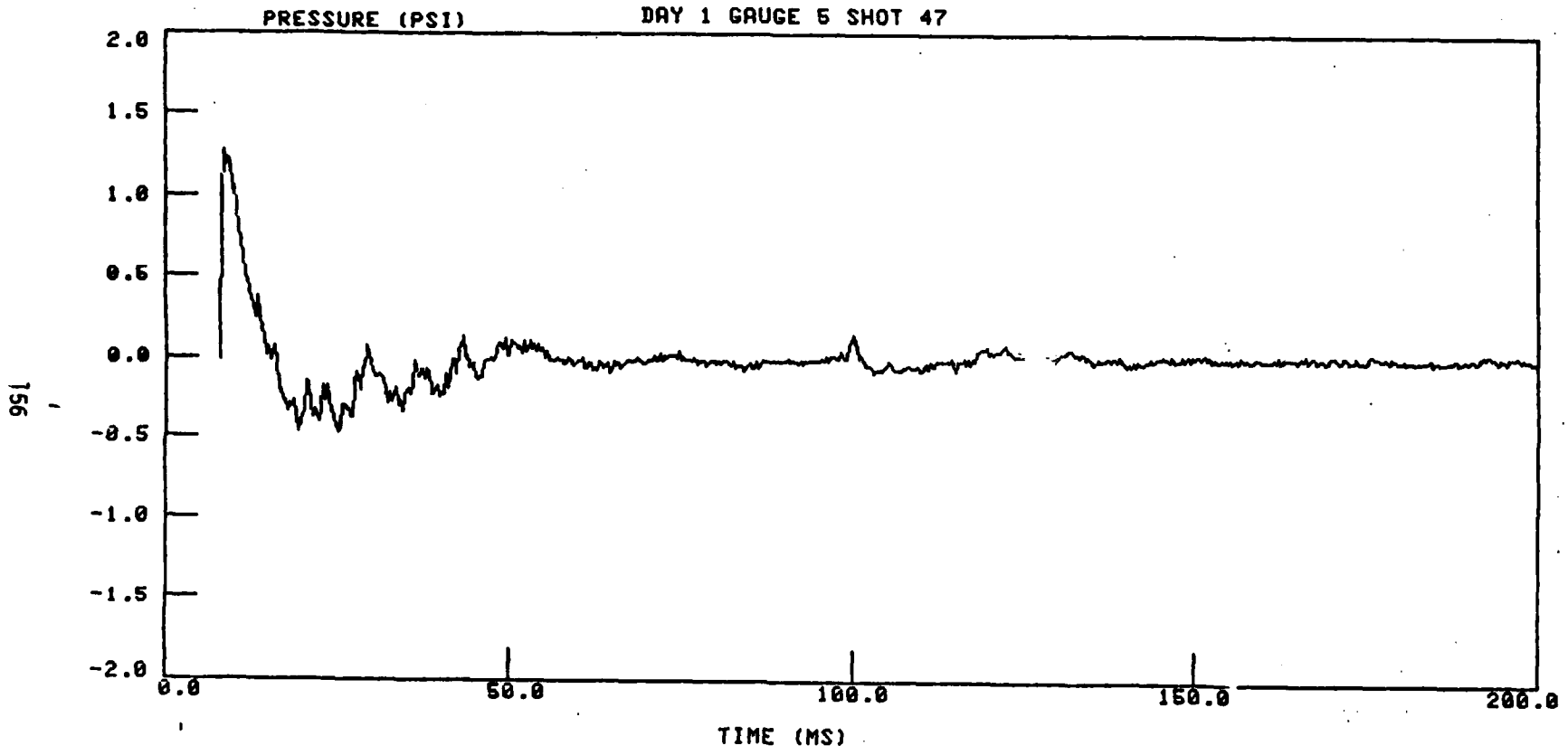

PRESSURE (PSI)
DAY 1 GAUGE 5 SHOT 47
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-57

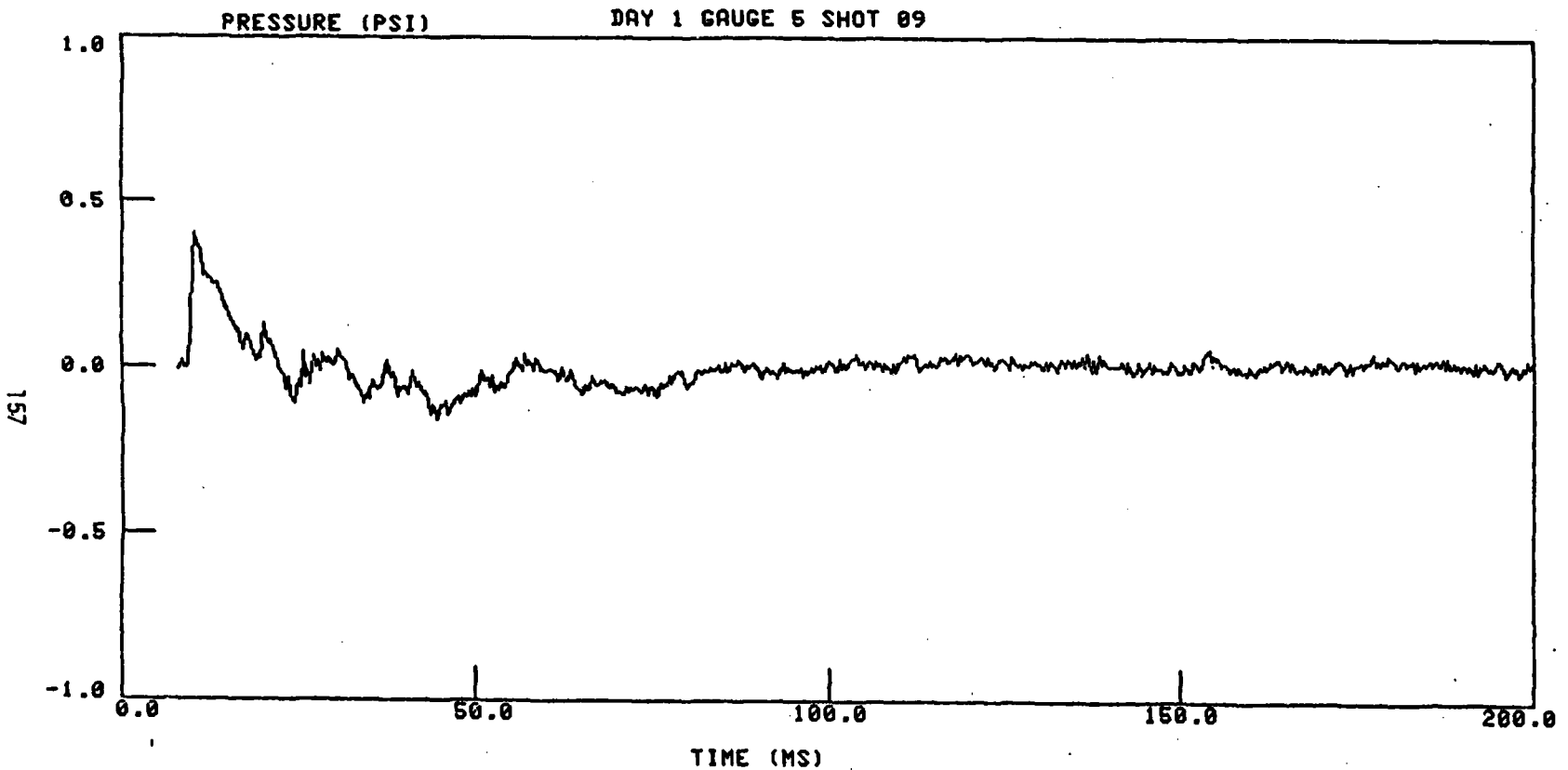

PRESSURE (PSI)
DAY 1 GAUGE 5 SHOT 09
1.0
0.5
0.0
-0.5
-1.0
LSI
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-58

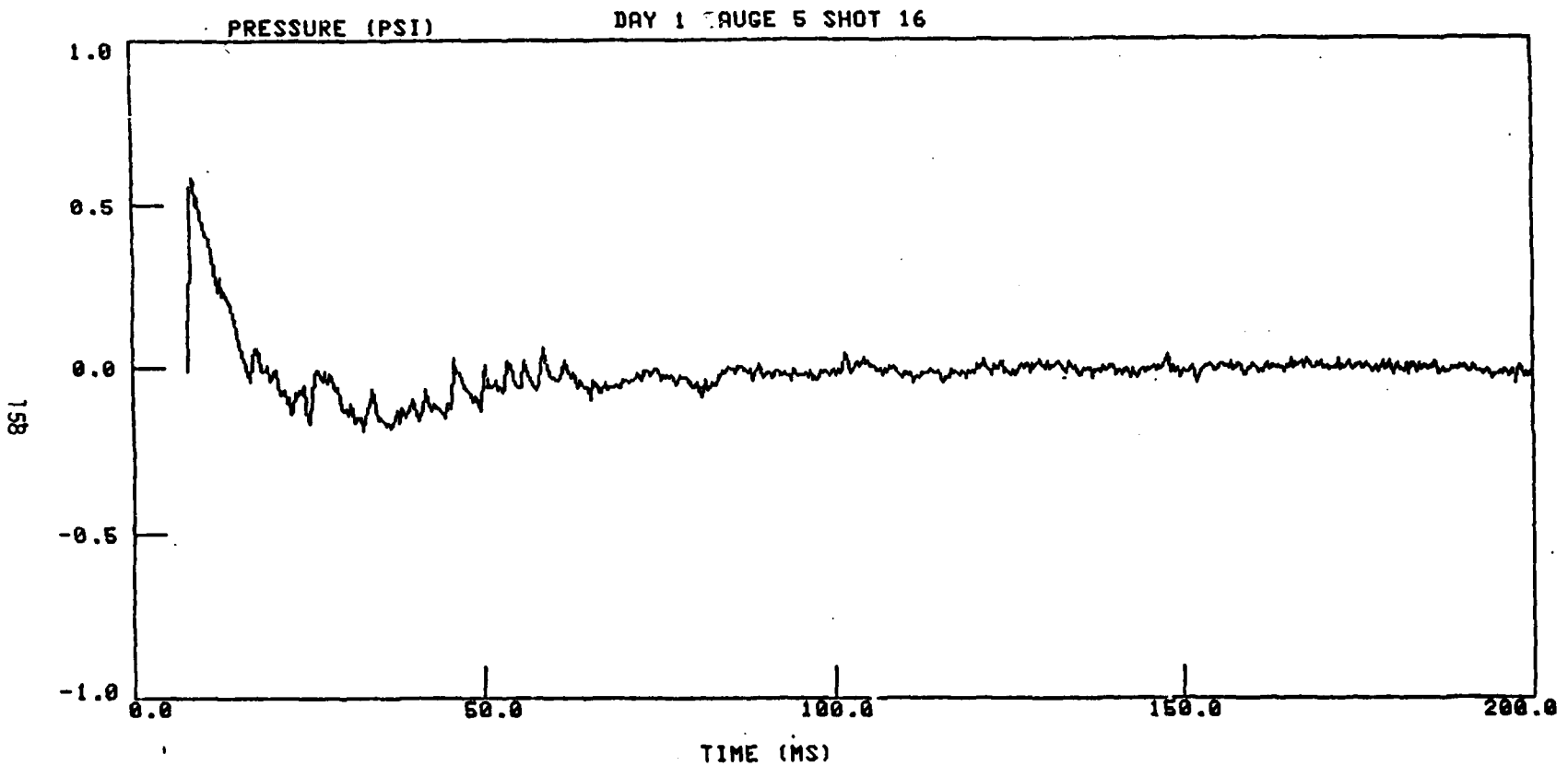

PRESSURE (PSI)
DAY 1 GAUGE 5 SHOT 16
1.0
0.5
0.0
-0.5
-1.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-59

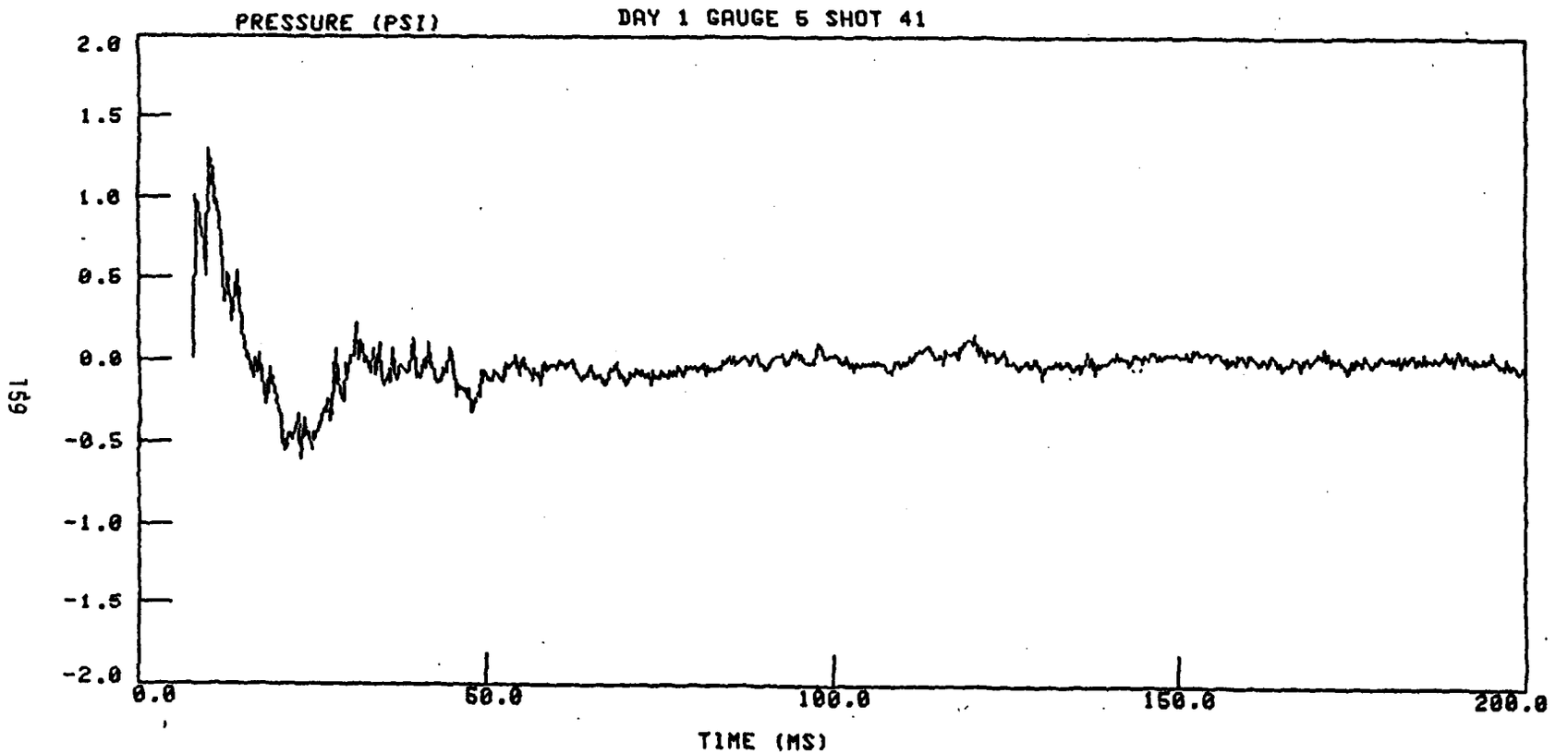

PRESSURE (PSI)
DAY 1 GAUGE 5 SHOT 41
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
50.0
100.0
150.0
200.0
TIME (MS)

Figure 7-60

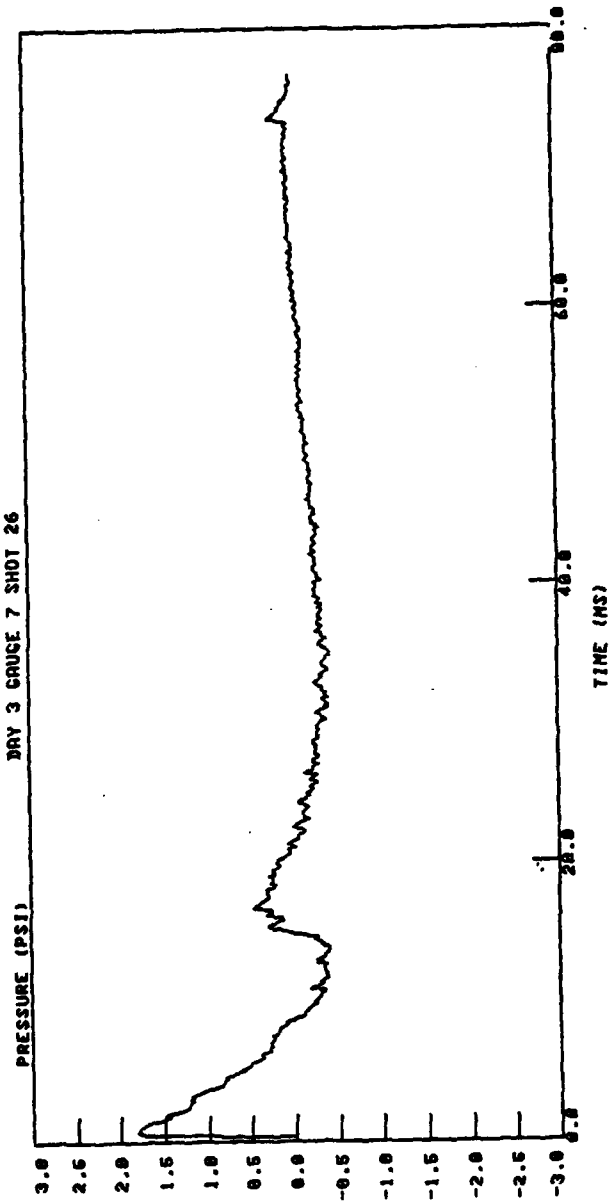

DAY 3 GAUGE 7 SHOT 26
PRESSURE (PSI)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
20.0
40.0
TIME (MS)

Figure 7-61

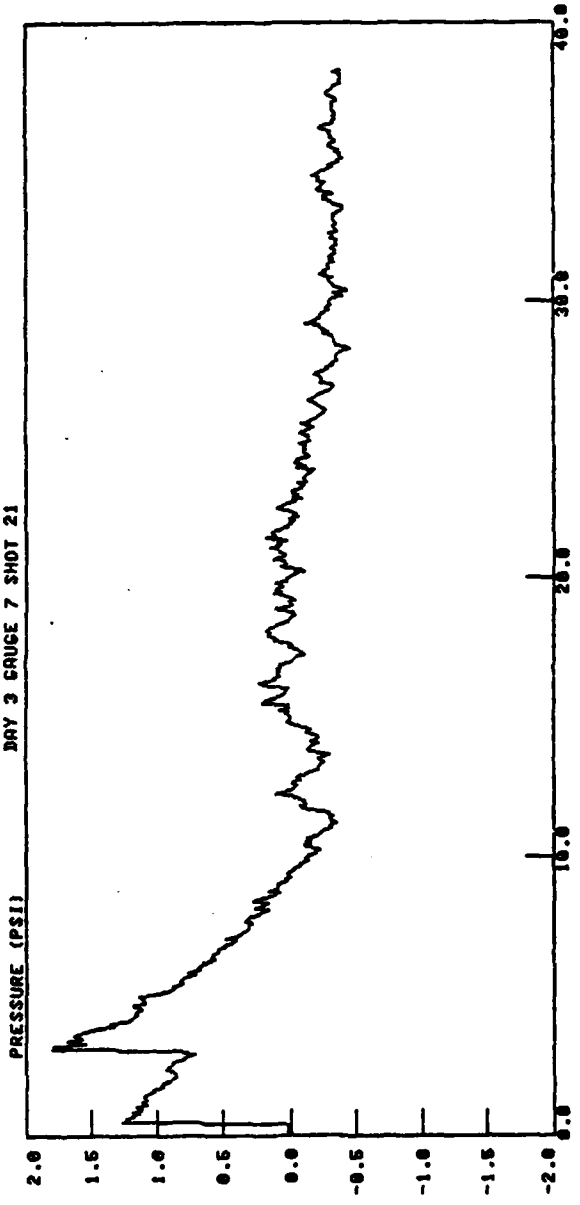

DAY 3 GAUGE 7 SHOT 21
PRESSURE (PSI)
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
10.0
20.0
30.0
40.0
TIME (NS)

Figure 7-62

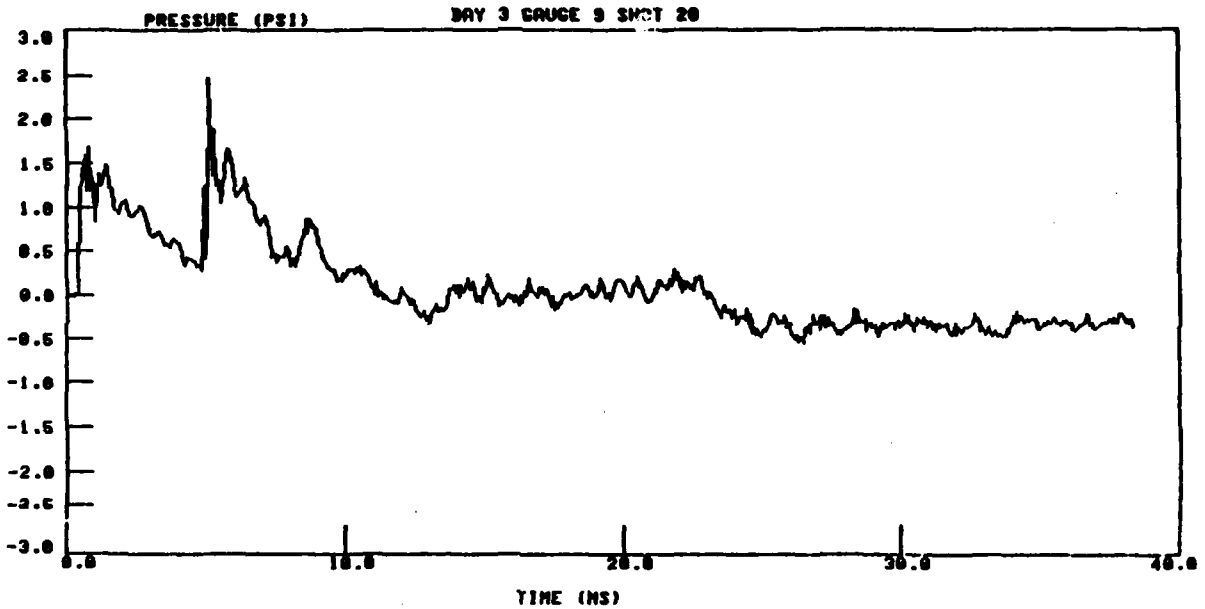

PRESSURE (PSI)
DAY 3 GAUGE 9 SHOT 20
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
0.0
10.0
20.0
30.0
40.0
TIME (NS)

Figure 7-63

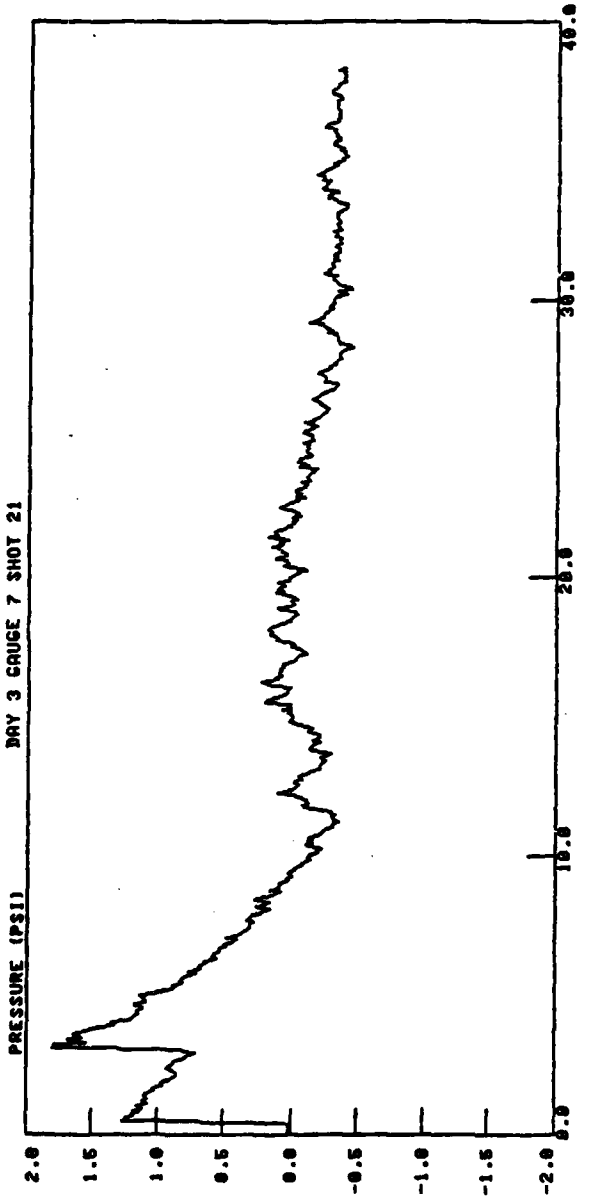

DAY 3 GAUGE 7 SHOT 21
PRESSURE (PSI)
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
10.0
20.0
30.0
40.0
TIME (MS)

Figure 7-62

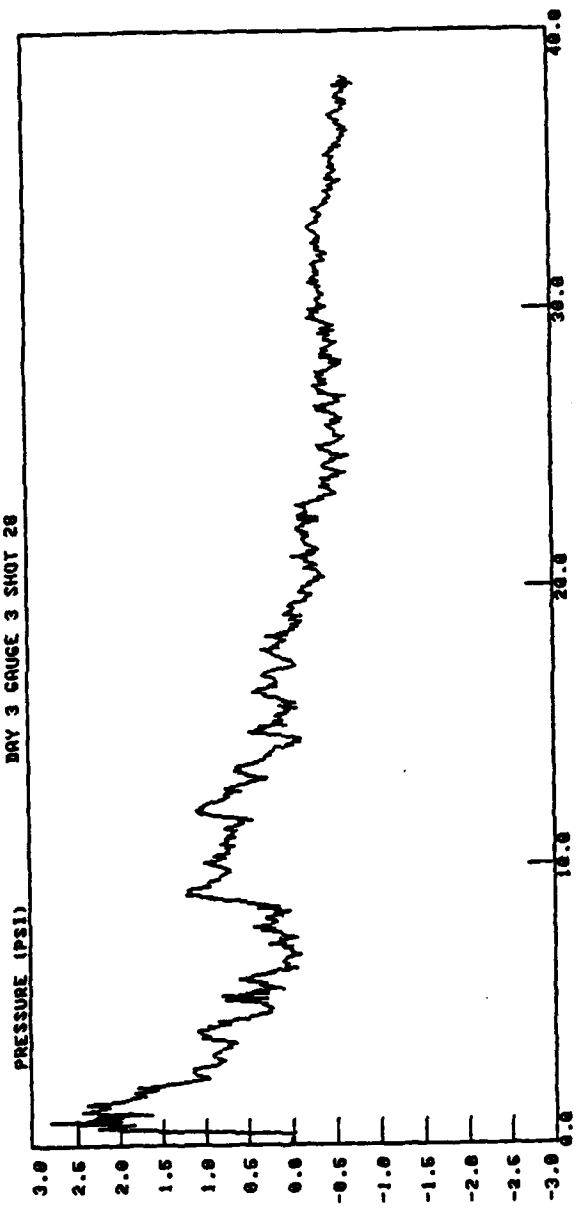

BAY 3 GAUGE 3 SHOT 28
PRESSURE (PSI)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
0.0
10.0
20.0
30.0
40.0
TIME (MS)

Figure 7-64

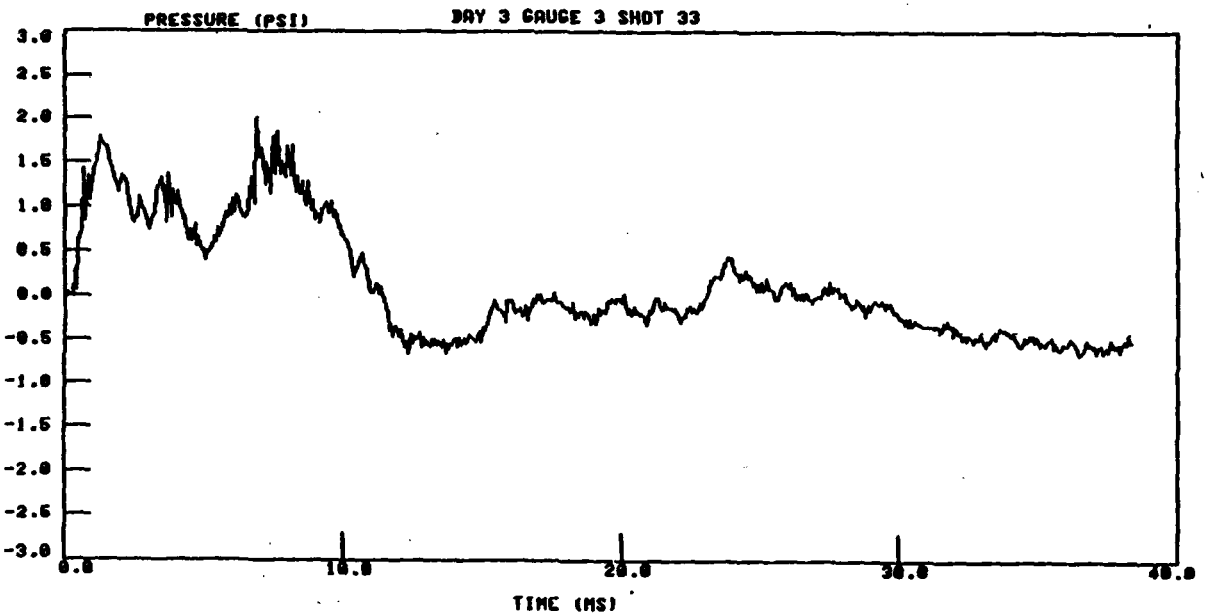

PRESSURE (PSI)
DAY 3 GAUGE 3 SHOT 33
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
0.0
10.0
20.0
30.0
40.0
TIME (MS)

Figure 7-65

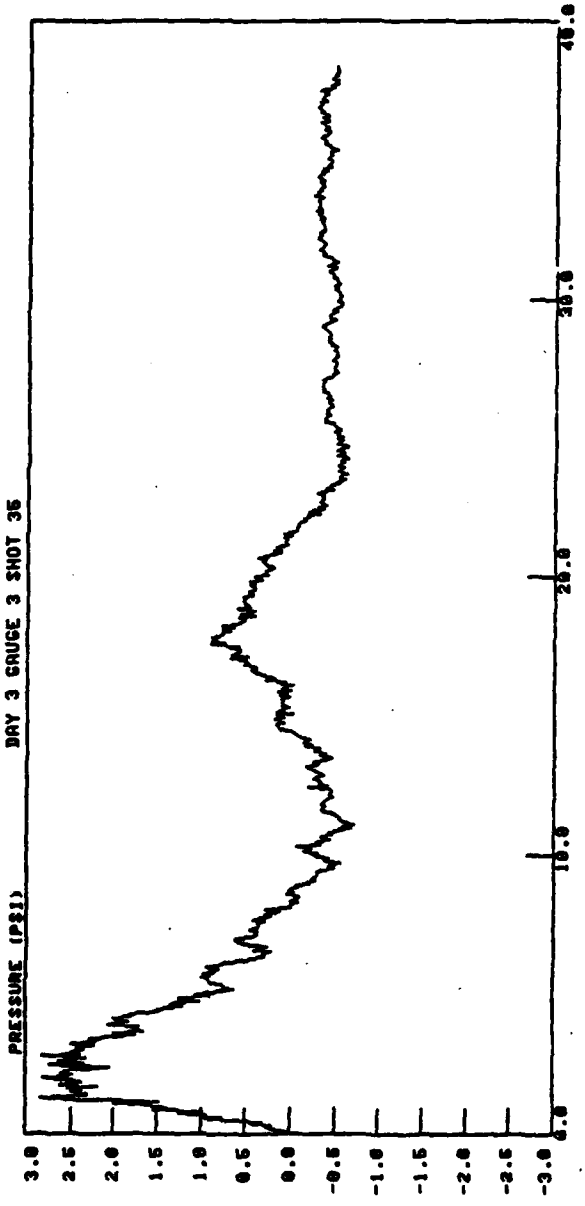

DAY 3 GAUGE 3 SHOT 35
PRESSURE (PSI)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
0.0
10.0
20.0
30.0
40.0
TIME (MS)

Figure 7-66

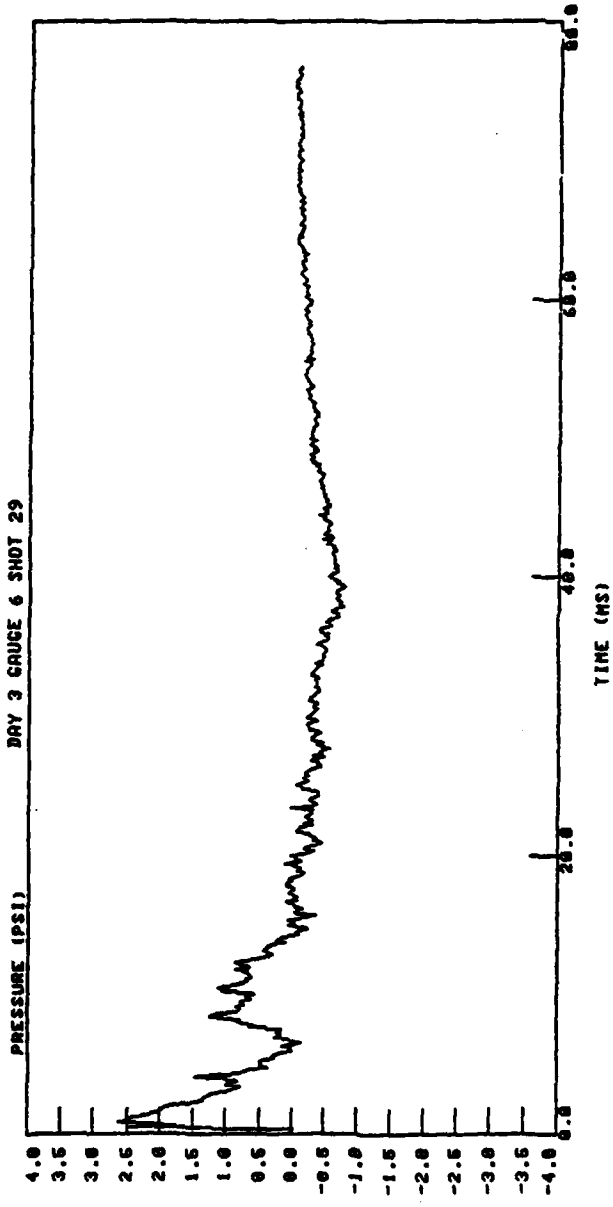

DAY 3 GAUGE 6 SHOT 29
PRESSURE (PSI)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
0.0
20.0
40.0
60.0
TIME (MS)

Figure 7-67

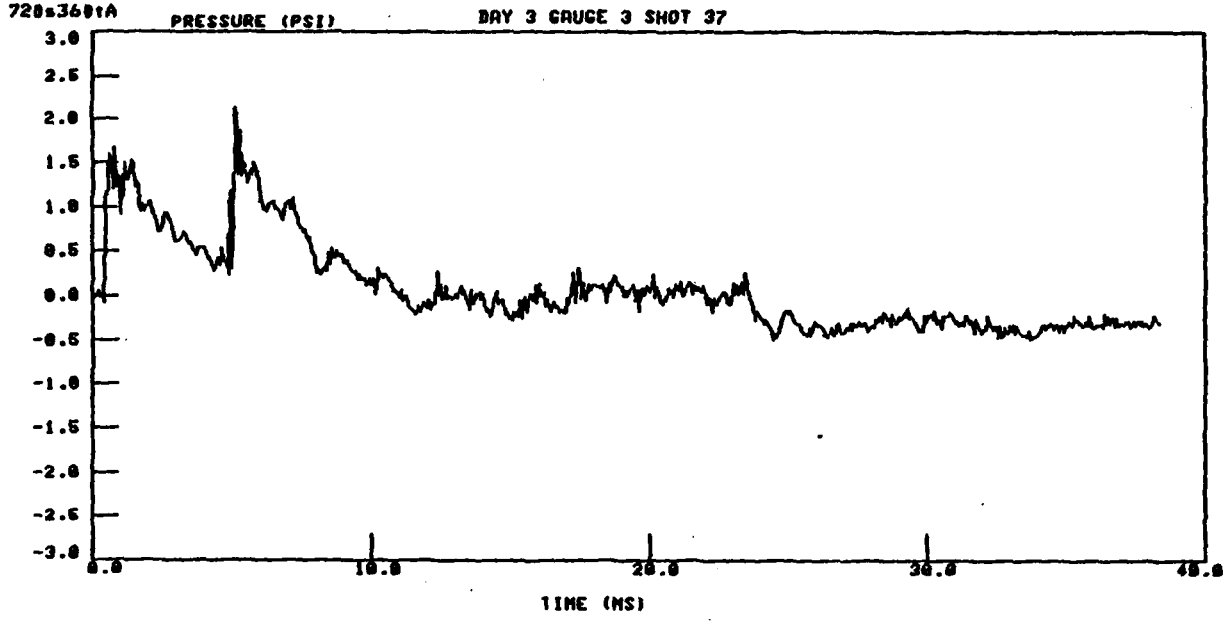

720x360tA
PRESSURE (PSI)
DAY 3 GAUGE 3 SHOT 37
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
0.0
10.0
20.0
30.0
40.0
TIME (MS)

Figure 7-68

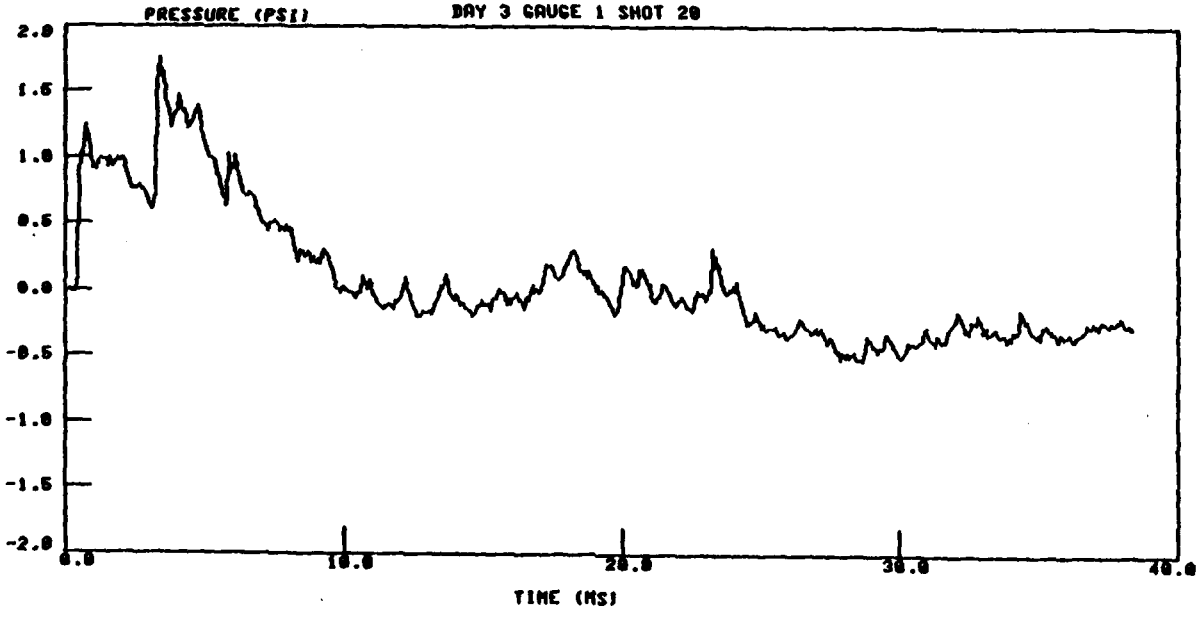

PRESSURE (PSI)
DAY 3 GAUGE 1 SHOT 20
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
10.0
20.0
30.0
40.0
TIME (MS)

Figure 7-69

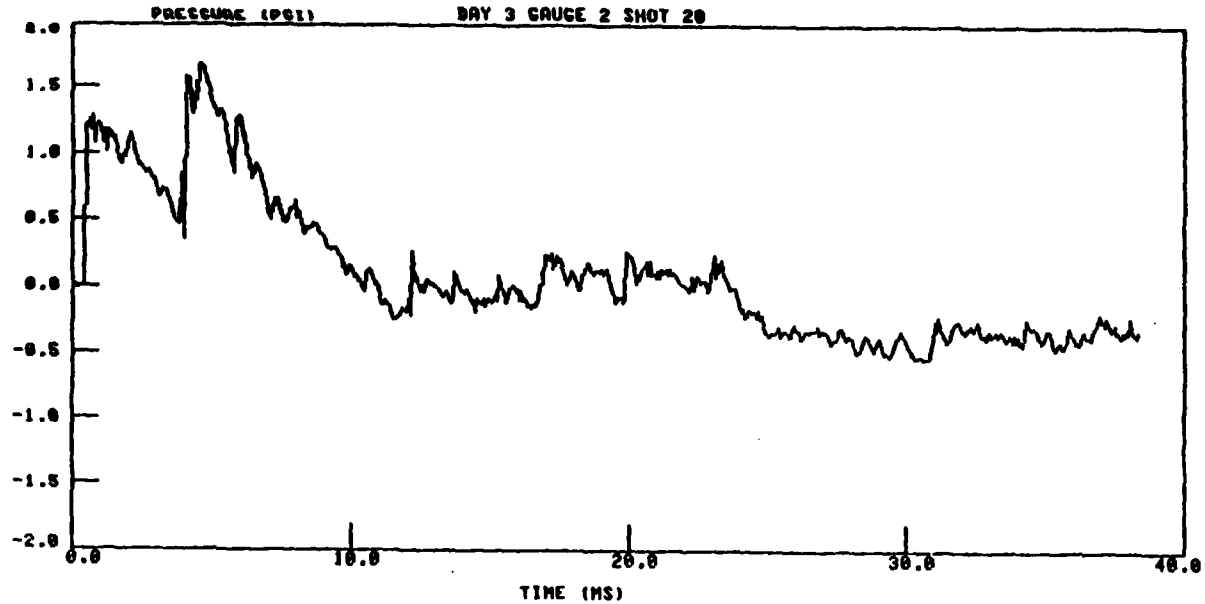

PRESSURE (PSI)
DAY 3 GAUGE 2 SHOT 20
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
10.0
20.0
30.0
40.0
TIME (MS)

Figure 7-70

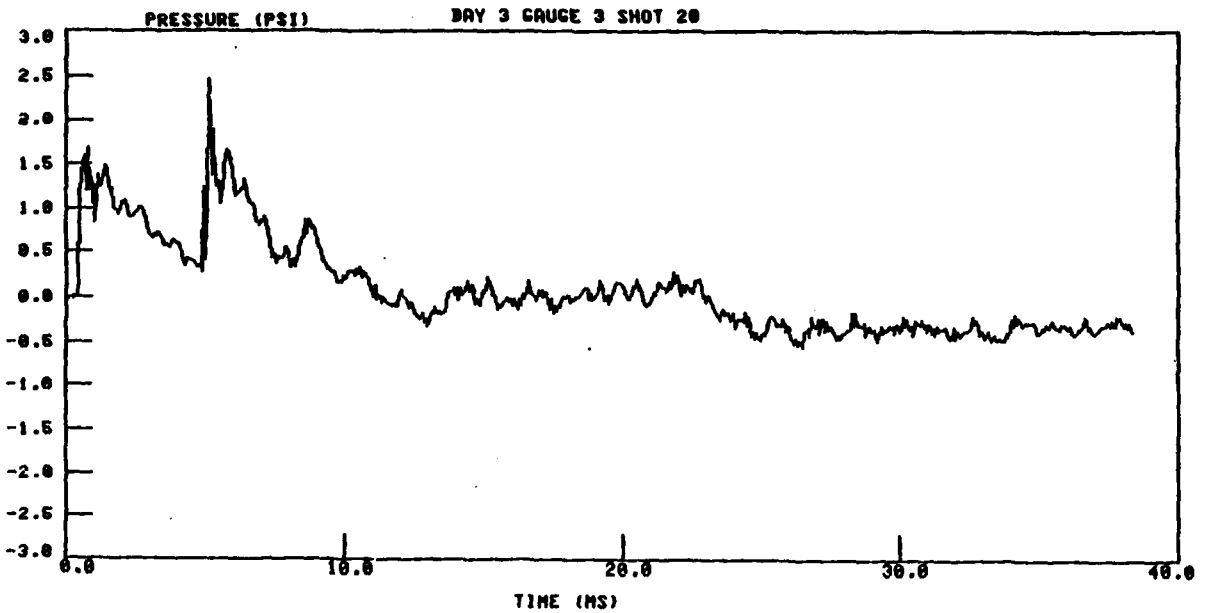

PRESSURE (PSI)
DAY 3 GAUGE 3 SHOT 20
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
0.0
10.0
20.0
30.0
40.0
TIME (MS)

Figure 7-71

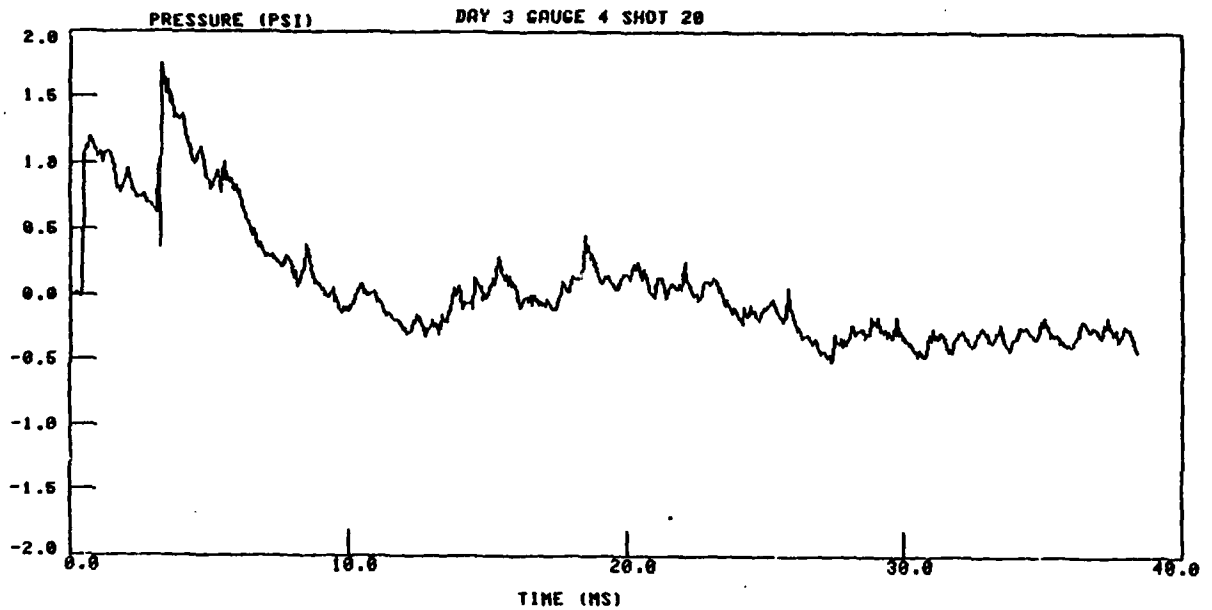

PRESSURE (PSI)
DAY 3 GAUGE 4 SHOT 20
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
10.0
20.0
30.0
40.0
TIME (MS)

Figure 7-72

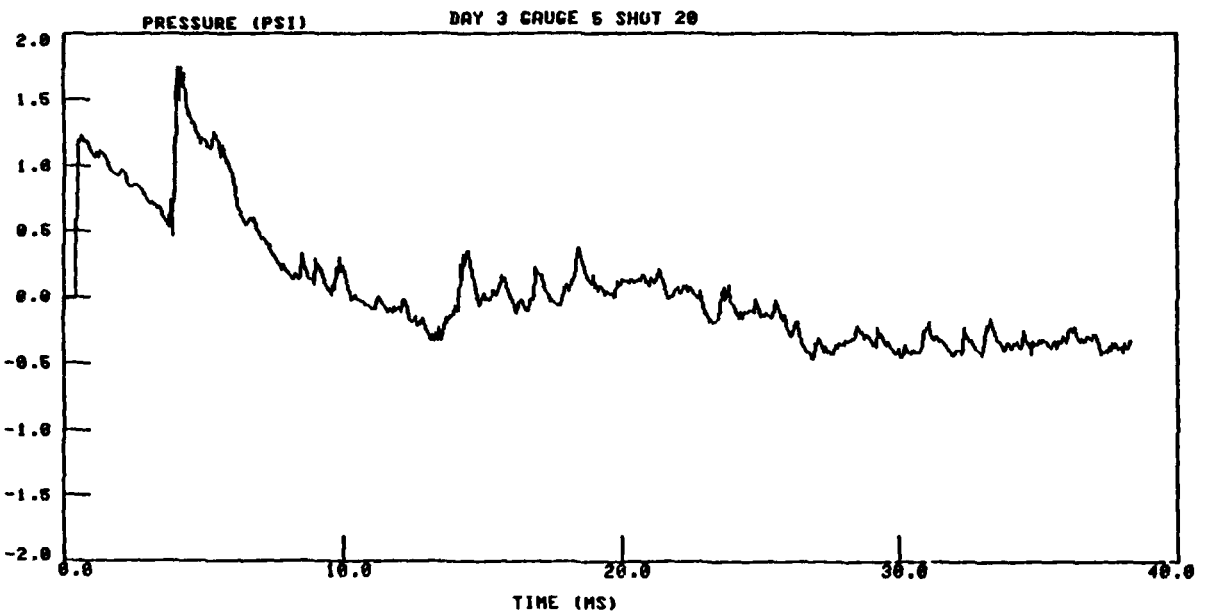

PRESSURE (PSI)
DAY 3 GAUGE 5 SHOT 20
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
10.0
20.0
30.0
40.0
TIME (MS)

Figure 7-73

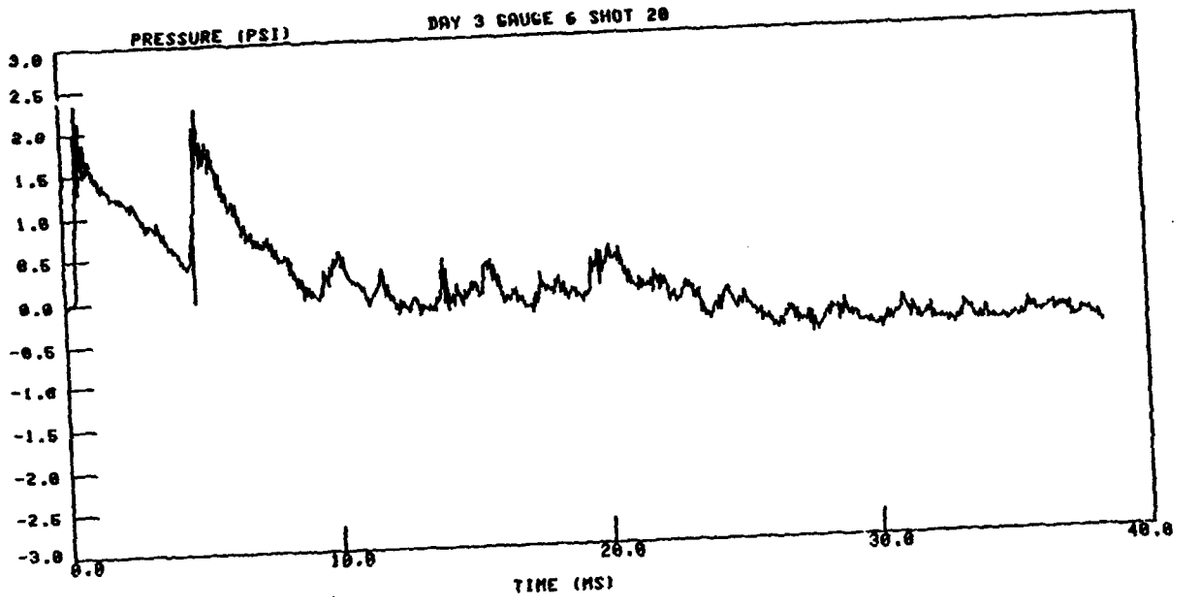

PRESSURE (PSI)
DAY 3 GAUGE 6 SHOT 20
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
0.0
10.0
20.0
30.0
40.0
TIME (MS)

Figure 7-74

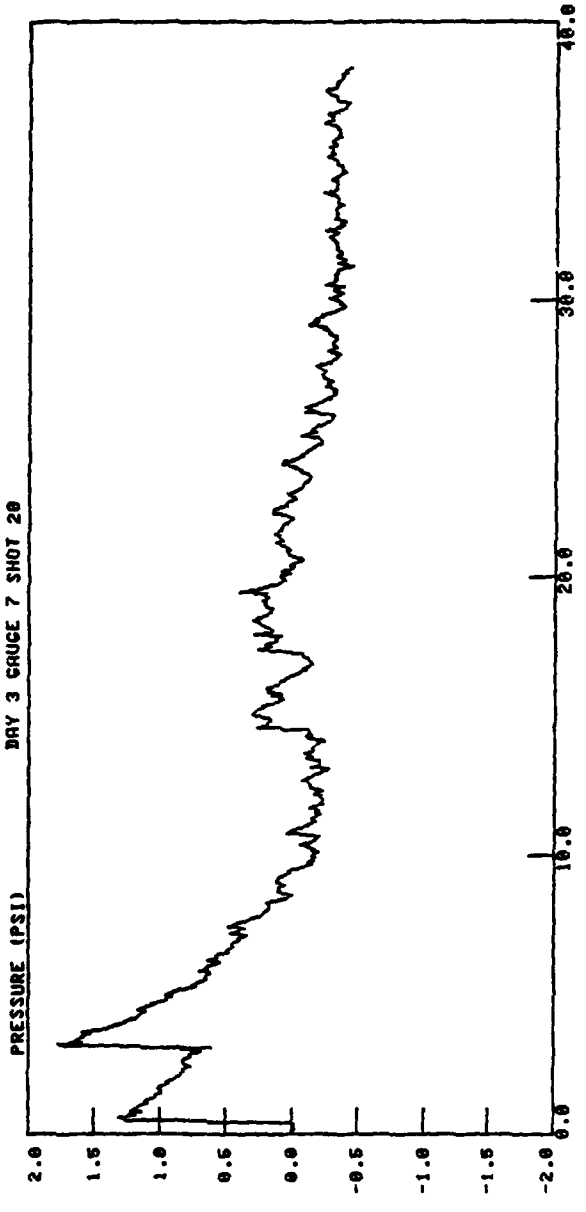

DAY 3 GAUGE 7 SHOT 20
PRESSURE (PSI)
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0.0
10.0
20.0
30.0
40.0
TIME (MS)

Figure 7-75

CONTRACT PUBLICATION AND PERSONNEL

Publications and personnel supported by this contract. Test Planning collection, and Analysis of Pressure Data Resulting from Army Weapon Systems - are listed in chronological order by volume, subject matter and personnel contributing to the effort.

November 1979 - Volume I -	Pure Tone Audiograms for Minipigs - Dr. William M. Jenkins Mr. Henry C. Evans, Jr.
April 1980 - Volume II -	Modeling of Far Field Data Dr. J. Stuhmiller Dr. F. Chan Dr. P Masiello M(s) K. Tani
May 1980 - Volume III -	A Correlation Window for the M198 Howitzer Dr. Steve Slinker Mr. Henry C. Evans, Jr.
May 1980 - Volume IV -	Data Analysis of the M198 and M109 May 1979 Firings Dr. Steve Slinker Dr. Henry C. Evans, Jr.
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